Impact of the anchor borrowers programme on maize productivity in Cross River State, Nigeria

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Abstract

Maize production in Nigeria is characterized by low productivity caused by wide variety of factors which include low investment as well as problems of financing. Despite various government policies and programmes to address poor finance, including the Anchor Borrowers Programmes (ABP), productivity has remained appallingly low, while studies on the programme's impact on productivity of maize farmers are not abundant. Hence, the impact of Anchor Borrowers Programme on maize productivity in Cross River state, Nigeria was examined. The study used a primary data collected through a semi-structured questionnaire from 250 maize farmers through a multi stage sampling procedure. The result showed that Maize farmers' age was 41 years and household size was 4 persons. Most farmers were male (78.0%), married (71.2%), had formal education (85.6%), non-members of cooperative (74.8%) and had primary occupation of farming (92.4%). About 73.6% of the farmers were participants of the ABP. Maize farming in Cross River State was productive with a mean productivity of 1.10. Furthermore, the average treatment effect showed that the participation of maize farmers in the ABP increased the productivity of maize farmers in Cross River state, Nigeria. Conclusively, Anchor Borrowers Programme increases the productivity of maize farmers in Cross River state. Hence, increased participation of maize farmers in the programme should be encouraged.

Keywords: Anchor Borrowers Programme (ABP), Maize productivity, Impact assessment, Farmers' participation

Introduction

Global maize cultivation spans 165 countries distributed across the Americas, Asia, Europe and Africa with about 197 M/ha dedicated land area and production volume of 86.2 M/tons (FAOSTAT, 2023). Among the growing regions, the Americas grows the highest proportion (45%), while Africa grows the least, only 8% (FAOSTAT, 2023) due to issues of low productivity. Global maize productivity only increased by about 2 tons/ha over the last 25 years. Average global yields stand at 5.9 tons/ha whereas Africa's average maize yield is 2.3 tons/ha (FAOSTAT, 2023). The marked yield differences between regions translate into varying sub-regional shares in production. Maize is considered a food security crop in different parts of Africa as it can be grown in different regions despite the low yields. It provides income for most agriculture households. Maize is

one of the most important staple foods in Nigeria. The crop plays an important role in terms of food security and nutritional intake, and accounts for about 43% of caloric intake with a daily consumption quantity of 53.20g per capita (FAOSTAT,2023).Maize is recognized as a major source of food and cash income among its predominantly small-holder farmers in Nigeria (Adeolu*et al*,2023).

Nigeria's maize yield however, further falls short of Africa's average with 1.7.tons/ha, despite being the largest producer of maize in West Africa. Low productivity has challenged of the Nigerian agricultural sector overtime, including the maize crop. Low maize productivity in Nigeria is characterised by a wide variety of factors of which agricultural credit facility (loan) remains dominant ((Maisharou *et al.*, 2015). Other factors include poor soil quality as a result of pollution, erosion and leaching, negative effect of climatic change on weather patterns, scarcity and high cost of inputs, planting of traditional varieties, use of crude implements by farmers and outdated farming practices employed by farmers. (Ajala*et al*,2023).Most of the farmers in the rural areas engage in subsistence agriculture and lack sufficient funds to procure improved inputs, expand their business, or even practice mechanized farming, with modern equipment such as plough, tractors and other labour saving devices. Low productivity hampers the goal of sufficient food production to feed the ever growing population of Nigeria. Loan sources available to farmers remain insufficient and limited especially in the rural areas, further affecting their productivity levels (Saheed, 2018).

In the bid to address the problems of access to credit and other input, the Anchors Borrowers Programme was launched on November, 2015 by the federal government of Nigeria. The Anchor Borrowers Programme (ABP) is an initiative by the Central Bank of Nigeria (CBN), intended to create a linkage between anchor companies involved in the processing of the required key agricultural commodities and smallholders (SHFs). The thrust of the ABP is the provision of farm input, in cash and kind (farm labour), to small holder farmers to boost production of maize and other agricultural crops, stabilize input supply to other agro-processor (anchor). At harvest, the SHF supplies his/her produce to the agro processors who pays the cash equivalents to the farmers account (Ojo *et al.*, 2023); Umeh *et al.*,2019). The Programme also aims at creating economic linkages between over 600,000 smallholder farmers and reputable large-scale processors to increase agricultural output and significantly improve capacity utilization of integrated mills.

Only a few studies had a direct linkage with the impact of the ABP on agricultural produce, one of

which was Salisu *et al.* (2022) who captured the impact of the ABP on agriculture in Nigeria but focused on rice production, not maize. Therefore, this study aims to examine the impact of the Anchor Borrowers Programme on maize productivity using Cross River State, Nigeria as a case study. Given the foregoing, the following questions were raised: What are the characteristics of maize farmers in the ABP in Cross River State? What is the productivity level of Maize farms in Cross River state? What is the impact of participating in ABP on Maize productivity in Cross River State?

Materials and Methods

Study area

The study was carried out in Cross River State, Nigeria. The state is a coastal state in south eastern Nigeria, named after the Cross River, which passes through the state. It shares boundaries with Benue state to the north, Enugu and Abia State to the west, to the east by Cameroon Republic and to the south by Akwa-Ibom state and the Atlantic ocean. Its Capital is at Calabar. The population of Cross River state was put at 2.89 million persons (NPC, 2006). Agriculture employs about 80% of the state's labour force and contribute highly to the Gross Domestic Product (GDP). Other economic activities of the people include transport and other commerce. Cross River is among the selected states for the implementation of the Anchor Borrowers Programme (ABP).

Data collection

Primary data for the study were collected with the aid of a semi-structured questionnaire through a multi-stage sampling procedure. First, three Local Government Areas (LGAs) with a high prevalence of maize production and high involvement in the ABP were purposively selected out of 18 LGAs in the state namely: Akpabuyo, Calabar Municipality and Akamkpa. Second, three wards from each LGA were purposively selected based on the high population of maize producers. The third stage involved the random selection of maize producers from each of the wards, proportionately. A total of 250 respondents were sampled.

Data analysis

Data obtained were analyzed with descriptive statistics, Total Factor Production function.(TFP) and Endogeneous Switching Regression Model. Descriptive statistics such as mean, percentage and frequency were used to profile the maize farmers in the study area in terms of their socio-economic characteristics.

Total Factor Productivity as used by Syverson (2011) was made employed in estimating the level of productivity amongst maize farmers within the study area.Computed using software programming package and expressed in equation (2):

$FP_t = A_t = Y_t / K_t \alpha KL_t \alpha IM_t$ ..... Equation 1

Where;

TFP=Total Factor Productivity,A_t =Factor neutral shifter, (TFP in this framework),Y_t=Total annual maize output (measured in terms of real revenue from annual sales),K_t= Capital inputs, (Naira) such as cost of maize seedling, agro chemicals and irrigation, Mt=Total Material inputs, Agro products used

(measured in terms of total expenditure on input less labour and capital inputs).L_t= Labour input (measured in terms of total wages for hired labour).

Endogeneous Switching Regression (ESR) model was used to analyze the impact of participating farmers in ABP on Maize productivity within Cross River State.The ESR model is a tool for analyzing binary outcomes when the decision to participate in the outcome generating process is itself endogeneous. ESR simultaneously models the decision to participate and the subsequent outcome using an instrument variable (IV) approach(Angrist and Lavy, 2001). The ESR model equation consists of two equations, one for selection (participation) and the other for the outcome of interest (outcome).The former treats the decision to choose an alternate course of action or not, while the latter represents the relationship between the outcome and the explanatory variables.

Participation equation:

$Pr(Z=1|X)=\Phi(\alpha + X'\beta+\lambda D)$ Equation 2

Where:

Φ is the standard normal cummulative distribution function, Z is a binary decision variable (acting or switching) that equals 1 if the individual participates in the activity and zero otherwise. X is a vector of covariates that influences the decision, D is an endogeneous variable (influenced by unobserved variables) that influences both the participation and the outcome variables, α and β are the parameters to be estimated that describe the impact of X on the participation rate,λ represents the effect of the endogeneous variable on participation.

Outcome equation:

$Y=\delta Z + y'X+\varepsilon$ ..... Equation 3

Where:

Y is the dependent variable, Z is the binary decision variable from the participatory equation, X is a vector of covariates related to the outcome variable, ε is the error term with zero mean and a constant variance, Equation 3 shows that the relationship between Y and Z is only present for participants, hence known as the treatment effect or local average treatment effect. The parameter δ represents the treatment effect of participation while *y* measures the relationship between the covariates and the outcome.

The ESR considers the two parts model which assumes that the decision to participate generates two types of observation: those who participate and those who do not.

Results and discussion

Socioeconomic characteristics of Maize farmers in Cross River State, Nigeria

The description of the socioeconomic characteristics of maize farmers in Cross River State, Nigeria is presented on Table 1. It revealed that 78% of the farmers were males, indicating a male dominance among the maize farmers. This could be due to the energy demanding traditional production prevalent in the State and the findings agree with Wiredu *et al.* (2010) who revealed that maize farming in Nigeria is male dominated. Age distribution of maize farmers reveals that all of the maize farmers fell are 60 years or younger, while the mean age is 40.5±7.3 years. This is in dissonance with the findings of Falola *et al.* (2022) who found that maize farming is dominated by the aged and experienced farmers. Further, majority

(78.8%) of the maize farmers have their household size within the range of 1-5 persons, while the mean household size was 4.4±1.4 persons. The distribution of marital status among the maize farmers revealed that 71.2% of the farmers were married and is in resonance with the findings of Salihu *et al.* (2021) who revealed that maize farming is dominated by the married at 93.21%.

Table 1 further shows that 85.6% of the maize farmers had formal education, indicating that majority of the maize farmers in the study area are literate having at least primary education, and as such will enhance the farmers participation in ABP within the study area. This result is in conformity with the findings revealed by Agboola *et al* (2021). Moreover, majority (92.4%) of the respondents were revealed to be engaged in farming as their primary occupation. Hence, they are likely to have higher drive to improve their productivity through the ABP. Most (74.8%) farmers belonged to at least one cooperative society. This could be as a result of the requirement by the ABP that participants should join a cooperative society. This indicates that members of any cooperative society stand the chance to be a participating member of the ABP and at the same time enjoy all of the benefits that comes with being a participating member. This result is in agreement with findings by Agboola *et al.* (2021) who revealed that membership of cooperative society has a significant influence on the participation of farmers in different agricultural intervention programme.

Productivity level of maize farmers across ABP participation

Table 2 below shows the level of productivity of maize farmers in Cross River State, Nigeria. From the result, majority (80.80%) of the maize farmers in Cross River were productive although the productivity level was not high. Also, it was shown that the mean productivity among maize farmers was 1.10, this shows that on average, most of the maize farmers in the study area were productive. This result is in consonance with the findings of Oluyole *et al.* (2013); who observed that employing primitive production techniques has made maize production low. It was further revealed from Table 2 that productivity of ABP participants was higher than that of non participants, and was found to be significant at 1%. The higher productivity level could be as a result of their participation which afforded them access to inputs for their maize production under the ABP, being the benefits enjoyed by the beneficiary farmers.

Impact of ABP on Productivity among Maize farmers

The results for the impact of participation in ABP on productivity among maize farmers in Cross River State are presented on Table 3. The endogeneous switching regression model was utilized to model the impact of ABP on maize farmers productivity in Cross River State as a result of assumed inherent endogenity in the model. From the result in Table 3, the p-value 0.0000($p< 0.05$) indicates that there is goodness of fit in the model. Ten variables were

used in the regression to estimate the model, these are farmer's age, sex,educational level, primary occupation,farming experience, member of cooperative, access to extension agents, age square (effect of age over time), household size and farm mechanization. The coefficient of the rho for the two regimes had no alternate signs, which implies that the individual farmer decision to be a participant of the ABP is not based on any form of comparative advantage. This outcome is consistent with a typical rural farmer whose family members serve as his primary source of labour. The productivity of participants and non-participants of ABP maize farmers is as presented in Table 3. The estimates were presented separately for participants and non-participants of ABP.

The result showed that the productivity of participant maize farmers increases significantly for those whose primary occupation was maize farming in the study area. This is in contrast with the findings of Omodara *et al* (2022) who revealed that farmers who participate in non farming activities and earn off-farm income were more likely to access agricultural loans. It was also observed that farmers' age over time had a significant negative influence on the productivity of maize farmers who participated in the ABP, while age had a positive effect on the productivity of the maize farmers. The negative influence of the age of farmer over time could be as a result of the general weakness of the farmer due to aging effect with time, which in essence will have significant effect on their level of productivity over time. Being male was also found to increase productivity and this result is in consonance with the result of Adegbite *et al.* (2023) who revealed that being male and had a positive impact on maize productivity.

For the non participants of ABP amongst the maize farmers, the result revealed that farming experience and type of farm mechanization had a positive significant effect on the productivity of non-participant ABP maize farmers. This is consistent with the findings of Adegbite *et al.* (2023), who found a relationship between farming experience/farm mechanization and farmers productivity. Also, the research revealed that age, educational level, access to extension agents and household size were found to have a negative effect on the productivity of the non-participant maize farmers in the ABP. This implies that the non participant ABP maize farmers' non contact with extension agents reduces their level of maize productivity.In addition, the low level of education of farmers within the study area might prevent them from meeting up with the beneficiary requirement that should enable their access to inputs for production process. Moreover, being a member of a cooperative society enhances farmers' participation and the chances of enjoying the project benefits such as use of improved agro-inputs. This in turn improves the level of maize productivity among the non participant farmers.

The finding agrees with Ekong (2003) and Ajayi and Ogunlola (2005), who reported that farmers in cooperatives have the advantage of accessibility to resources, micro-credit, input subsidy and social capital needed to improve productivity.

Conclusions and recommendations

The study concluded that majority of the maize farmers in Cross River State were participants in the Anchor Borrowers Programme. It was ascertained from the study that most maize farmers in Cross River State were productive with a higher significant productivity of farmers participating in ABP than the non participants. Finally, it was confirmed that participation in the Anchor Borrowers Programme increased the maize productivity among the farmers. Based on the findings of the study, policy options to improve maize productivity should target increased farmer participation in ABP to increase productivity of maize farmers.

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Table 1: Distribution of socioeconomic characteristics of maize farmers in Cross River State

Participants	Non-participants	Pooled			
Variables	**Frequency**	**Percentage**	**Frequency**	**Percentage**	**Frequency**	**Percentage**
Sex	n=184		n=66		n=250	
Male	137	74.46	57	86.36	194	77.60
Female	47	25.54	9	13.64	56	22.40
Age(in years)						
21-30	21	11.41	8	12.12	29	11.60
31-40	79	42.93	31	46.97	110	44.00
41-60	84	45.65	27	40.91	111	44.40
Mean		40.56		40.24		40.48
Standard deviation		7.49		6.91		7.33
Marital status						
Unmarried	58	31.52	14	21.21	72	28.80
Married	126	68.48	52	78.79	178	71.20
Educational level						
Informal	26	14.13	10	15.15	36	14.40
Formal	158	85.87	56	84.85	214	85.60
Household size(in person)						
1-5	141	76.63	56	84.85	197	78.80
6-10	43	23.37	10	15.15	53	21.20
Mean		4.43		4.21		4.376
Standard deviation		1.39		1.40		1.3922
Primary occupation						
Farming	175	95.11	56	84.85	231	92.40
Non farming	9	4.89	10	15.15	19	7.60
Membership of cooperative						
Yes	158	85.87	29	43.94	187	74.80
No	26	14.13	37	56.06	63	25.20

Source :Field survey, 2023

Table 2: Level of Productivity amongst Maize farmers in Cross River State

	Participants		Non-participants		Pooled	
Level of productivity	**Frequency**	**Percentage**	**Frequency**	**Percentage**	**Frequency**	**Percentage**
Unproductive (0.01 -0.99)	19	18.32	29	43.94	48	19.20
Productive (Above 0.99)	165	81.68	37	56.06	202	80.80
Mean (S.D)		1.12(2.35)		1.08(3.17)		1.10(7.202)

Source:Field Survey, 2023.

Table 3: Impact of ABP on Productivity among Maize farmers

	Participant				Non-participant				Pooled			
Variables	Coefficient	Std error	Z	p>/z/	Coefficient	Std error	Z	p>/z/	Coefficient	Std error	Z	p>/z/
Age	0.1351	0.0538**	2.51	0.012	-0.1535	0.1404	-1.09	0.275	0.0788	0.1775	0.44	0.657
Sex	-0.8349	0.0930	-0.90	0.369	0.1465	0.3455	0.42	0.672	-1.2859	0.3612	-3.56	0.000
Educational level	0.2101	0.1173	1.79	0.073	-0.2959	0.2467	-1.20	0.230	0.2213	0.3471	0.64	0.524
Primary occupation	0.6130	0.1775***	3.45	0.001	0.6218	0.3425	1.82	0.069	1.0841	0.4349***	2.49	0.013
Farming experience	0.0255	0.1569	1.63	0.104	0.3072	0.2775	1.11	0.268	-0.5019	0.0413	-1.22	0.224
Farm mechanization	0.5038	0.0903	5.58	0.000	0.5242**	0.2719	1.93	0.054	-0.1097	0.3236	-0.34	0.735
Mem of cooperative	0.1293	0.1128	1.15	0.252	-0.3999**	0.2115	-1.89	0.059	0.1855	0.3133	0.59	0.554
Access to extension	1.1002	0.2058	5.35	0.000	-0.1186	0.5689	-0.21	0.835	2.0994	0.3764	5.58	0.000
Age square	-0.0018	0.006***	-2.80	0.005	0.0020	0.0017	1.15	0.250	-0.0009	0.0021	-0.44	0.661
Household size	0.0068	0.0296	0.23	0.820	-0.0464	0.0756	-0.61	0.540	-0.1097	0.3236	-0.34	0.735
Access to agric training									0.6916	0.3561**	1.94	0.052
Cons	-3.5984	1.1584	-3.11	0.002	3.0838	2.8647	1.08	0.282	-2.7585	3.7717	-0.73	0.465
No of observation					250							
Wald chi 2(10)		96.95										
Prob> chi 2		0.0000										
Sigma_1	0.5180	0.0328										
Sigma_2	0.6635	0.5901										
Rho_1	0.8308	0.1327										
Rho_2	0.9091	0.5355										
Log lilkelihood	-250.288 09											

***,**,* indicate significance at 1%,5% and 10%, respectively

Source: Field Survey,2023.