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Impact of USAID-MARKETS II Intervention on Productivity of Rice Farming Households in Eastern Nigeria.

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Abstract

Among the efforts made by Nigerian government to promote sustainable self-sufficiency in rice production is the UASID-Maximizing Agricultural Revenue and Key Enterprises in Targeted Sites (MARKETS), initiated in 2005. This study analysed the impact of USAIDMARKETS II project on the productivity of rice faming households in Ebonyi State, Nigeria. Multi-stage sampling technique was employed in the selection of the respondents for the study. A total of 491 rice farming households, comprising of 239 participants and 252 non-participants of the project, were sampled. Structured questionnaire, focus group discussions and field observation were used in data collection. The data were collected on production and socio-economic variables relating to 2017/2018 production season. Data collected were analysed using Total Factor Productivity Model, Propensity Score Matching and Local Average Treatment Effect (LATE). The USAID-MARKETS II project employed several empowerment strategies towards improving the productivity of farming households in the project sites. These include, supply of improved rice seeds, fertilizers, technology development, training and extension support. The result of PSM shows that USAID-MARKETS II have a positive and significant impact on productivity of the participants by 1.075 (38.1% increase in TFP). The Average Treatment Effect on the Treated (ATE) for sampled rice farming households from the overall population is larger with a value of 1.178 (41.7%) compared to the untreated category. The LATE estimate revealed a significant mean difference of 0.406 (7.8%) in rice productivity between participants and non-participants. The analysis also divulges that the average increase in total productivity brought about by participation in USAID-MARKETS II is 0.396 (14% increase in TFP). Despite the significant impact of the project on productivity, there is the need for government to further intensify agricultural empowerment programmes by strengthening the public private partnership linkages that will address sustainable development along the rice value chain in Nigeria.

Keywords: Farming-households, Impact, Intervention, Productivity, USAID-MARKETS II

INTRODUCTION

Nigeria is blessed with climatic, vegetation and soil conditions suitable for rice production. Nigeria ranks as the highest importer of rice in West Africa, and the second largest rice importer in the world, after Indonesia (Onyekwena, 2016). Despite policies made by Nigerian government

in the rice sector, rice production has failed to keep pace with the growing domestic demand as a result of low rice productivity. Low rice productivity in Nigeria has been attributed to the prevalence of rainfed rice growing systems, low inputs use and not using improved varieties by the farmers (Onyekwena, 2016). USAID MARKETS II project was initiated to assist rice producers with adequate knowledge and skills to enhance rice productivity, income and their well-being (USAID-MARKETS, 2010). After many years of its operation, it becomes necessary to assess the impact of USAID-MARKETS II on the productivity of rice farming households.

Methodology

The study was conducted in Ebonyi State in Eastern Nigeria. Agriculture is a major occupation in Ebonyi State, with 85% of the population earning their living from one form of agriculture or another. Among the agricultural potential is the production of the famous Abakaliki rice cultivated in an estimated area of 311,208 hectare of land by over 140 thousand farmers (Ebonyi State ADP, 2018).

Multi-stage sampling procedures were used for this study. 239 participating rice farming households were selected from the list of USAID-MARKETS II participants in 12 sampled villages using Yemen Taro scientific formula for calculating sample size. In order to control for spill-over effect, 252 non-participating rice farming households were selected from the list of 6 sampled villages that did not participate in USAID-MARKETS II to give a total sample size of 491.Yemen Taro, (1967) scientific formula adopted is given as n = $\frac{N}{1+N(\propto^2)}$, 5% room for error was given in selecting the sample size. Where n is the sample size, N is the sample frame and $\propto^2$ is the precision level (0.05). Data were collected from primary source with the aid of structured questionnaire, focus group discussion and field observations. The cost route survey approach was used in collecting the required data in three stages – after planting, weeding and after harvesting of rice for 2018 season. Data collected were analyzed using inferential statistics such as Propensity Score Matching (PSM), Local Average Treatment Effect (LATE) and Total Factor Productivity (TFP) model as used by Coelli, (1996).

RESULTS AND DISCUSSION

Impact of USAID-MARKETS II on Productivity
Due to the problem of selection bias and particularly non-compliance or problem of endogeneity, this study used a combination of methods to assess the impact of USAID-MARKETS II on rice productivity. Local Average Treatment Effect (LATE) model and Propensity Score Matching (PSM) were employed. For propensity score, nearest neighbor matching method was used to match. To obtain the propensity score matching estimator through the logit regression, individual socio-economic and institutional variables was used to form matched pairs of observational similar individual characteristics (Table 1).

Table 1: Result of Logit on Determinants of Participation in USAID-MARKETS II

variables	coefficient	Std err	Z
Age	-0.151	0.065	-2.33**
House size	0.424	0.195	2.17**
Farm size	0.331	0.719	0.46
Extension visit	4.277	0.883	4.84***
Years of coop	0.806	0.131	6.17***
Education	-0.230	0.115	-1.99**
Sex	-0.756	0.898	-0.84
Yrs of exp.	-0.212	0.068	-3.11***
Credit amount	2.2e-06	5.7e-06	0.37
Constant	0.331	0.230	1.44
No of obs=476			
LR Chi2(9) = 95.23			
Prob >chi 2= 0.0000			
Pseudo R2 = 0.4022			
Loglikehood = 62.257			

Source: Field Survey, 2018. Note: *** and ** is significant at 1% and 5% respectively.

The log-likelihood of -62.257, the pseudo R2 of 0.4022 and the LR(Chi2) of 95.23 (Significant at 1% level), implies that the overall model is well fitted into the data and the explanatory variables used in the model were collectively able to explain the probability of participation in USAID-MARKETS II. The result presented in Table 1 showed that the likelihood of participation in USAID-MARKETS II increases with household size, extension visit and years in cooperative but decreases with age, education and years of rice farming experience.

Table 2: Impact of USAID-MARKETS II on Productivity.

	sample	Treated	Control	Difference	Std. err	t-stat
TFP	unmatched	2.822	2.415	0.407	0.126	3.23**
	ATT	3.144	2.069	1.075	0.544	1.98*
	ATU	2.265	3.321	1.056		
	ATE			1.178		
Estimation		Parameter		Robust std err		Z-value
LATE by WALD		0.396		0.143		2.77***
Estimation by mean diff						
Participants		2.821		0.123		22.90***
Non-participants		2.415		0.033		72.54***
Observed difference		0.406		0.128		3.18***

Source: Field Survey, 2018. Note: ***,**,* is significant at 1%, 5% and 10% respectively.

The result in Table 2 revealed that the average total factor productivity (TFP) of the participants was 2.822. This means that on the average, if the present level of the productive inputs were used

by the participants in the production of rice, it will more than double the rice output. This is an indication of increasing return to scale. The average impact estimation shows that USAID-MARKETS II had a significant and positive impact on productivity of the beneficiaries. The treatment effect on the treated (ATT) on the average had a positive impact and increases productivity of the participants by 1.075 (38%). The average effect of the treatment (ATE) for sampled rice farming households is larger with a value of 1.178 compared to the treated category. The average treatment effect on the untreated (ATU) had a significant and positive (1.056) impact on productivity, this is the counter factual outcome of the treated had it been they were not treated. The positive impact of USAID-MARKETS II on productivity is similar to the finding of Awotide, Diagne and Omonona, (2012).

The LATE estimate was carried out for the outcome of interest (productivity) using WALD estimator proposed by Imbens and Angrist, (1994). The result of its (LATE) mean difference as shown in Table 2 is that there was a significant difference of 0.406 (7.75% difference) in rice productivity between the participants and non-participants. Specifically, the LATE estimate analysis as presented in Table 2 showed that USAID-MARKETS II significantly and positively increase rice productivity by 0.396 (14% increase in their productivity). This is the average change in total productivity brought about by the participation in USAID-MARKETS II. This finding is in line with the work of Adebayo and Olagunju, (2015).

Conclusion

USAID-MARKETS II had impact on the productivity of rice farming households by 38% increment in their Total Factor Productivity (by PSM) and 14% increment (by LATE). The study therefore recommend that government should intensify agricultural empowerment programmes by strengthening the public private partnership linkages that will address sustainable development along the rice value chain in Nigeria.

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