Heterogeneous Impact of Institutional Services on Input Use Intensity and Commercial Transformation among Smallholder Farmers in Oyo State, Nigeria using Heckman Two stage Estimation

[1]M. O. Adio and [1]L. O. Olarinde

[1]Faculty of Agricultural Sciences, Department of Agricultural Economics,Ladoke Akintola University of Technology,P. M. B 4000, Ogbomoso, Nigeria.

ABSTRACT

This study examined the heterogeneous impact of institutional services of credit, input supply, and extension in the overall commercial transformation process of smallholder agriculture in Oyo State, Nigeria using heckman two stage estimation. Multistage sampling technique was used to select the smallholder farmers in the study area. Data were subjected to descriptive statistics and heckman two stage estimation. The average family size in the two zones was 5(five). The literacy level of the respondents revealed that 45.27% of the respondents had no formal education; others (54.73%) had formal education ranging from primary to tertiary. The mean age in Ogbomoso Zone was 51 years, while that of Oyo Zone was 52 years. Average land holding in the zones was about 2 hectares.

Heckman's two-stage estimation of market participation of smallholder farmers revealed that yield, farm size, and sex were statistically significant in determining the smallholders' participation as seller in crop market. The degree of participation in crop market was influenced by value of crop produced, distance to the nearest market, farming experience, gender, years of schooling, age, and family size, all with expected signs.

Keywords:

Institutional support services; commercial transformation ; heckman.

1. INTRODUCTION

Approximately 2.5 billion people live directly from agricultural production systems, either as full- or part-time farmers, or as members of farming households that support farming activities (World Bank, 2008). Smallholders produce food and non-food products on a small scale with limited external inputs, cultivating field and tree crops as well as livestock, fish and other aquatic organisms e.g. oysters, etc.But they are not always full-time smallholders. Many, in fact most, poor families earn their incomes in multiple ways, and productivity on farms should be viewed in the overall context of total family income (Reardon, 1998).

Smallholders manage over 80 per cent of the world's estimated 500 million small farms and provide over 80 per cent of the food consumed in a large part of the developing world, contributing significantly to poverty reduction and food security. Yet small-scale farmers often live in remote and

environmentally fragile locations and are generally part of marginalized and disenfranchised populations.

Smallholders have often been neglected in debates on the future of agriculture, and left out of policymaking at numerous levels (Wiggins 2011).Ofthe developing world's three billion rural people, over two-thirds reside on small farms of less than two hectares; there are nearly 500 million of such small farms. Despite recurring predictions that small farms will soon disappear, they have proved remarkably persistent. Indeed, an increasing part of agricultural land in the developing world is being operated in small farms. The importance of farming in household incomes may have declined, but the number of rural households that use farming as a platform for their livelihood strategies continues to grow (IFPRI, 2005).

Meeting the challenge of improving rural incomes will require some form of transformation out of the semi-subsistence, low income and low-productivity farming system that currently characterize much of rural area in Oyo state, Nigeria

2. OBJECTIVE OF THE STUDY

The main objective of the study was toanalyze the heterogeneous impact of institutional services on input use intensity and commercial transformation among smallholder farmers agriculture in Oyo State, Nigeria using heckman two stage estimation.

Specific Objectives

The specific objectives were to:

1. describe the socioeconomic characteristics of smallholder farmers in the study area
4. analyze the determinants of market participation of smallholder farmers and the extent of participation.

3. HYPOTHESES

H_o: access to institutional support services have no significant effects on smallholder farmers crop production and market participation.

4. LITERATURE REVIEW

Agricultural Commercialization

Meaning of Agricultural Commercialization

Pradhan et al., (2010) stated that agricultural commercialization refers to the process of increasing the proportion of agricultural production that is sold by farmers. Commercialization of agriculture as a characteristic of agricultural change is more than whether or not a cash crop is present to a certain extent in a production system. It can take many different forms by either occurring on the output side of production with increased marketed surplus or occur on the input side with increased use of purchased inputs. Commercialization is the outcome of a simultaneous decision-making behavior of farm house-holds in production and marketing (von Braun et al., 1994).Govereh et al. (1999) defined agricultural commercialization as "the proportion of

agricultural production that is marketed". According to these researchers, agricultural commercialization aims to bring about a shift from production for solely domestic consumption to production dominantly market-oriented. In line with the above definitions, Sokoni (2007) defined commercialization of smallholder production as "a process involving the transformation from production for household subsistence to production for the market." Hazell et al. (2007) found out that most definitions refer to agricultural commercialization as "the degree of participation in the output markets with the focus very much on cash incomes."

However, there are some writers who attach profit motive as an integral part of agricultural commercialization. Among others, Pingali and Rosengrant (1995) noted that agricultural commercialization goes beyond just selling in the output market. They claim that a household's marketing decisions, both in the output and input choice, should be based on profit maximization. According to Pingali and Rosengrant (1995), commercialization does not only occur by the reorientation of agriculture to high valued cash crops but it could also occur by reorienting it to primary food crops (Hazell et al. 2007). According to Von Braun et al. (1994), commercialization of subsistence agriculture takes many forms. They state that: "Commercialization can occur *on the output side* of production with increased marketed surplus, but it can also occur *on the input side* with increased use of purchased inputs. Commercialization is not restricted to just cash crops: The so called traditional food crops are frequently marketed to a considerable extent, and the so called cash crops are retained, to a substantial extent, on the farm for home consumption, as, for instance, groundnuts in West Africa. Also, increased commercialization is not necessarily identical with expansion of the cash economy when there exist considerable inland transactions and payments with food commodities for land use or laborers. Finally, commercialization of agriculture is not identical with commercialization of the rural economy." This study focuses on the degree of participation of farm households on the output market.

Measuring Agricultural Commercialization

According to Govereh et al. (1999), "commercialization can be measured along a continuum from zero (total subsistence-oriented production) to unity (100% production is sold)." Strasberg et al. (1999) suggested a measurement index called household Crop Commercialization Index (CCI) which is computed as the ratio of gross value of all crop sales over gross value of all crop production multiplied by hundred. The advantage of using this approach is that it "avoids the use of crude distinctions ascommercialized and non-commercialized farms" (Govereh et al. 1999). However, this index is not without its limitations. For instance, consider the case when a farmer growing one quintal (100kg) of teff sells that all and another farmer producing ten quintals of teff sells only

two quintals. The CCI will tell us that the first farmer is fully commercialized (100%) while the second is semi-commercialized (20%). This interpretation does not make sense in such circumstances. Even though this limitation of using CCI is worth noting, there is still some room to use it in practice especially in the context of developing countries where it is less likely to get smallholders selling all of their output and very large farms selling none of their output (Govereh et al. 1999). As can be understood from the preceding discussion, the degree of participation in the output market is the conventional way to measure commercialization. However, Von Braun et al. (1994) provide other dimensions to the measurement of commercialization.

Commercialization is calculated as percentage of the total produce sold from a household or as a percentage of cash crops as compared to all crops cultivated by a household. Von Braun et al (1994), have specified the forms of commercialization andintegration into the cash economy from at least three different angles and measured the extentof their prevalence at the household level with the following ratios:

(1a) Commercialization of agriculture (output side) = Value of agricultural sales in markets

Agricultural production value

(1b) Commercialization of agriculture (input side) = Value of inputs acquired from market

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(3) Degree of integration into the cash economy = acquired by cash transactions

(2) Commercialization of rural economy = acquired through market transactions

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Market participation

William *et al.* (2008) defined market participation in terms of sales as a fraction of total output, for the sum of all agricultural crop production in the household which includes annuals and perennials, locally-processed and industrial crops, fruits and agro-forestry. This sales index would be zero for a household that sells nothing, and could be greater than unity for households that add value to their crop production via further processing and/or storage. Market participation is both a cause and a consequence of economic development. Markets offer households the opportunity to specialize according to comparative advantage and thereby enjoy welfare gains from trade. Recognition of the potential of markets as engines of economic development and structural transformation gave rise to a market-led paradigm of agricultural development (Reardon and Timmer, 2005).

Improvements in market participation are necessary to link smallholder farmers to markets in order to expand demand for agricultural products as well as set opportunities for income generation (Pingali, 1997). Market-orientation enhances consumers‘ purchasing power for food, while enabling re-allocation of household incomes by producers to high-value nonfood agribusiness sectors and off-farm enterprises (Davis, 2006). Specific opportunities exist in non-trade distorting measures such as irrigation, intensification, extension and input supply. In addition, niche markets for differentiated products, contracts with village-level institutions (e.g., schools, hotels), and investments in value addition are areas where smallholder farmers would considerably benefit if challenges to their effective participation were addressed (Omiti *et al*., 2007). The rationale for enhancing participation in commercial agriculture also stems from the potential to accelerate attainment of the Millennium Development Goals on food security and poverty reduction through utilization of untapped opportunities in commodity value chains (MOFED, 2006).

5. METHODOLOGYStudy Area

The study was carried out in Oyo State. Oyo State is located in the South West geopolitical zone of Nigeria, carved out of the former western state of Nigeria in 1976.Oyo State lies between latitude 7°N and 8°N of the equator and between longitude 3°E and 5° E of the Greenwich meridian in the rainforest zone and also extends forward to derived savanna zone. It is bounded in the west by Ogun State and partly by the Republic of Benin, in the North by Kwara State, in theEast by Osun State and on the South by Ogun State. The population of Oyo State according to the National Population Commissionis 6,617,720 (NPC, 2012 estimated). The State is made up of 33 local government areas. The state capital is Ibadan. It covers about 27,107.5 km² land area with annual rainfall of 1091.4mm and average maximum and minimum temperature of 44.56°C and 24.43°C.

The State enjoys a tropical humid climate with two climatic seasons, the rainy season that prevails from April to October and the dry season that lasts from November to March. The southern part of the State is dominated by the tropical rainforest while the guinea savanna belt dominates the remaining parts. Averages daily temperature ranges between 25°C (77.0°F) and 35°C(95°F) almost throughout the year

Why Oyo State

Enabling environment that makes Oyo State attractive for agriculture.

Good climate and vegetation, political stability and responsive government (peaceful environment), good market demand shown by high population, availability of good arable land for large scale farming with estimated cultivable size of 27,107.93sq.km. Also, presence of Agricultural Institutions and related agencies to meet research, advisory services and manpower needs of investors. These include: Oyo State Agricultural Development Programme (OYSADEP), Oyo State Agricultural Input supply company (OYSAISCO), Institute of Agricultural research and Training (IAR&T) inter alia. Presence of Financial Institution: Commercial Banks, Oyo State Micro Finance Bank, Bank of Agriculture, Bank of Industry, and Nigeria Agricultural Insurance Company (NAIC)

The climate and vegetation of Oyo State support the cultivation and rearing of a large variety of crops and animals as shown next Therearetwodistinctseasonsnamely:Wetanddryseasons.TheWetseasonisbetweenAprilandOctober whilethedryseasonisbetweenNovemberand Marchandischaracterizedbyhotweather.Themean annualrainfallisbetween 1,194mmintheNorthand1,264mmintheSouthernpart.Meantemperatureis270C.Thesouthernpartofth eStatewhichconsistsofLocalGovernmentsinIbada nfallwithintheForestZonewhileLocalGovernmen tsinOyo,Ogbomoso,SakiandIbarapacouldbeclass ifiedasoccupyingderivedSavannahZone.Howeve rpocketsofforestvegetationcouldbefoundalongthe rivervalleysandstreamsfound(existing)acrossthe State.TheStatehasover20noofearthdamswhichco uldbeusedforirrigationfarming.

Majority of the people in the study area are smallholders who are involved in farming and trading. They grow arable crops, (maize, yam, cassava, millet, rice, plantain, cocoa tree, palm tree, cashew, etc) fruit crops, and also engage in small scale poultry, goat, cattle and fish farming.

Primary data was used in this study through well structured questionnaire. Multistage sampling technique was used to select the smallholder farmers in the study area.

6. Analytical Technique: Model Specifications

Heckman Two stage Model.

Heckman's sample selection model is based on the following two latent variable models:

$$y_1 = b'X + U_1$$
$$y_2 = g'Z + U_2$$

Where X is a K-vector of regressors, Z is an m-vector of regressors, possibly including 1's for

the intercepts, and the erro terms U_1 and U_2 are jointly normally distributed, independently of *X* and *Z*, with zero expectations. The first model is the model we are interested in. However, the latent variableY_1 is only observed if $Y_2 > 0$. Thus, the actual dependent variable is:

$Y = Y_1 if Y_2 > 0, Y$ is a missing value if Y_2 £ 0.

The latent variable Y_2 itself is not observable, but only its sign: We only know that $Y_2 > 0$ if Y isobservable, and Y_2 £ 0 if not. Consequently, we may without loss of generality normalizeU_2 such that its variance is equal to 1.

The dependent variable for equation 1, Y_1 is: Value of Crop Sold.

And the independent variables are:

X_1 = Value of Crop Produced (yield), X_2 = age (years), X_3= age square (years), X_4 = sex, X_5 = literacy level (SCHLATT), X_6 = Household size, X_7 = Farm size (FRMSIZE), X_8 = Distance to Market (DISTMKT), X_9= Market Information for Sale (MKTINFOSAL)

The dependent variable for equation 2, Y_2 is household market participation as a seller in Crop Market

And the independent variables are:X_1 = Value of Crop Produced (yield), X_2 = age (years), X_3= age square (years), X_4 = sex, X_5 = literacy level (SCHLATT), X_6 = Household size, X_7 = Farm size (FRMSIZE), X_8= Access to Market Information for Sale (ACCMKTINFO),

All coefficients and standard errors would be adjusted for sampling weights, clustering, and stratification, using the SVY estimation command (STATACorp, 2011)

Result and Discussion.

Table 1: Socio-economic characteristics of the respondents

	Ogbomoso		Oyo	
Age range	Frequency	Percentage	Frequency	Percentage
21-30	3	1.46	9	6.25
31-40	6	2.93	16	11.11
41-50	92	44.88	43	29.86
51-60	71	34.63	44	30.56
61-70	24	11.71	21	14.58
71-80	8	3.90	10	6.94
81-90	1	0.49	1	0.69
Total	205	100	144	100
Experience				
0-10	20	9.76	7	4.86
11-20	52	25.37	38	26.39
21-30	72	35.12	50	34.72
31-40	39	19.02	29	20.14
41-50	16	7.80	14	9.72
51-60	5	2.44	5	3.47
61-70	1	0. 49	1	0.69
Total	205	100	144	100

Source: Field Survey, 2013

The mean age in Ogbomoso Zone is 51 years, while that of Oyo Zone is 52 years.Majority of the farmers, 57 (39.58%) and 101(49.27%) are within this age range in Oyo and Ogbomoso zone respectively. This show that most of the respondents are agile, active and in their productive years when they can put in their best for optimum productivity. This implies that about half of the population in the zones under study was involved in active farm production. Also age is considered to be of relevance to the quality of physical labour, especially in developing countries where health and nutritional levels are poor (Fapohunda, 1984). This assertion could contribute to their level of receptivity to new technology. Average land holding is about 2 ha.Farming Experience of the Respondents reveals that the average farming experience in Ogbomoso Zone is 27 years, while that of Oyo Zone is 26 years. The

farmers' decision making about a particular enterprise, combinations or acceptance of Institutional Support Services, can be influenced to some extent by the years of experience, increase with the age of the farmers also, the number of years farmers spend in farming business could give an indication of the practical knowledge acquired over a number of years. Hence, experience has a considerable effect on production efficiency.

Marital status shows that almost all the farmers are married and as such, suggesting that they will have a reasonable family size providing more labour compared to the unmarried. Marital status analysis reveals that most respondents in the two Zones are married, and the average family size in the two zones are 5(five) individuals. Marital status is directly linked with the farmers' performance. This shows the level of stability of the farmer. The high percentage of married respondents conforms favourably to Jibowo's (1992) study that majority of adult population of a society consist of married people.

The study also reveals that literacy level of the respondents is very high, less than 50% of the respondents had no formal education; others (54.73%) had formal education ranging from primary to tertiary. This probably implies that the people in the study area have an average level of education. A farmer's level of education is expected to influence his ability to adopt agricultural innovations and make decisions on various aspects of farming. Education is highly important for any meaningful development. Education also increases productivity. Many of the farmers who could not have education have undergone informal education. However, it does not imply that those that had no formal education lacked the skill of farming which they had acquired from their many years of experience. About 54% of the plots considered in this study were planted with maize, Yam and Cassava.Most of the credits for fertilizer, improved seeds, and agrochemicals come from farmer cooperatives, the daily and monthly contributions, respectively. Similarly, most of the input supply services for fertilizer and improved seeds come from farmer cooperatives. These results indicate that credit and input supply services for an input may be jointly provided. The private sector seems to be more active in agro-chemicals, although its involvement in fertilizer and improved seeds is very limited.

About 34% of the sample households had access to credit and input supply services for fertilizer. Slightly above 3% of the sample households had access to credit and input supply services for chemicals had access to credit and input supply for chemicals. These results indicate that credit and input supply services for an input may be jointly provided. The private sector (agro dealers) seems to be more active in agro-chemicals, although its involvement in fertilizer and improved seeds is very limited.

From the total sample households about 39% of them participated in extension program the previous year.

Market participation and value of crop sold

Heckman's two-step estimation results are presented in Table 2.

Results show that the variables that affect market participation are not necessarily the variables that affect quantity of output sold. Participation in crop market as seller is influenced by value of crop produced, distance to market, and access to market information, all with expected signs. Higher value of crop produced increases probability of participation. Distance to nearest market reduces likelihood of participation because of increased marketing costs. Access to market information as a source of network and information exchange, increase market participation in the study areas. The degree of participation in crop market is influenced by value of crop produced, age of household head, and family size, all with expected signs. Value of crop produced is a very important factor determining the degree of crop market participation, because of the possibility of higher marketable surplus. Farm size is significantly associated with a higher level of output sold. Land size indicates the potential to produce surplus for the market. This confirms the findings by Olwande et al, (2010), that households with larger farm sizes are able to produce marketable surplus and hence participate more in the market. Education is posited to influence a household's understanding of market dynamics and therefore improve decisions about the amount of output sold, inter alia Makhura, et al, (2001). Experienced household heads are able to make better production decisions and have greater contacts which allow trading opportunities to be discovered at lower cost

Table 2: Heckman's two-step estimation results.

Variables	Coefficients.	Std. error.	P	Marginal effect
Outputsold				
Yield	1.44e-06*	4.24e-07	0.001	0.001
Access to credit for fertilizers	-0.271	0.888	0.760	0.760
Access to credit for seed	0.936	0.883	0.289	0.289
Market information prior to sale	-0.0544	0.122	0.655	0.655
Farm size	0.366**	0.120	0.002	0.002
Age	0.026	0.030	0.372	0.372
Age^2	-0.0002	0.0003	0.385	0.385
Sex	-0.314**	0.133	0.018	0.018
School attended	0.0866	0.096	0.368	0.368
Household size	0.0293	0.0294	0.320	0.320
Constant	10.211	0.815	0.000	
Participation in market				
Yield	4.96e-06*	1.49e-06	0.001	0.001
Distant to market	1.315*	0.510	0.010	0.010
Access to market information	0.0609	0.282	0.829	0.829
Farming experience	0.0310**	0.019	0.035	0.035
Age	-0.385**	0.177	0.030	0.030
Age^2	0.0036**	0.00172	0.036	0.036
Sex	1.0686*	0.320	0.001	0.001
School attended	0.781*	0.302	0.010	0.010
Household size	-0.223**	0.0838	0.008	0.008
Constant	7.451	4.420	0.092	0.092
Mills				
Lambda	-0.8687982			
Rho	-1.00000			
Sigma	0.86879816			
Lambda	-0.86879816			
Number of observation	347			
Censored observation	24			
Uncensored observation	323			
Wald chi^2(9)	123.86			
Prob. >chi^2	0.0000			

* significant at 1%, ** significant at 5%, *** significant at 10%
Source: Field Survey, 2013

Heterogeneous impact

Heckman's two stage estimation results for market participation as a crop seller

Heterogeneous impact of male Respondents in their Active years (18-59years). From Table 3, the heterogeneous impact at zonal level reveals that for male respondents in their active age (productive), yield has a substantial impact on the probability of participation in markets. The reason being that value of crop produced is a very important factor determining the degree of crop market participation, because of the possibility of higher marketable

surplus.Therefore all effort at increasing the yield should be encouraged which includes simultaneous access to institutional support services of credit, input supply and extension.

Table 3: Heterogeneous impact of male Respondents in their Active years in the zones

	Zones							
	Ogbomoso				**Oyo**			
Variables	Coef.	Std. Err	P	Marginal effect	Coef.	Std. Err	P	Marginal effect
Outputsold								
Yield	1.90e-06**	8.65e-07	0.028	0.028	1.23e-06**	0.196	0.008	0.008
Access to credit for fertilizers	-0.169	0.474	0.721	0.721	0.5191	104004.2	0.120	0.120
Access to credit for seed	0.70	0.463	0.131	0.131				
Market information prior to sale	0.0200	0.128	0.876	0.876	0.582	134538	0.235	0.235
Farm size	0.140	0.192	0.464	0.464	0.466**	66819.28	0.005	0.005
Age	0.0680	0.0420	0.105	0.105	0.0566	44738.61	0.557	0.557
Age^2	-0.00096**	0.00048	0.045	0.043	-0.000547	462.263	0.562	0.562
School attended	-0.145	0.105	0.167	0.167	0.186	42304.01	0.143	0.143
Household size	0.0819***	0.043	0.057	0.395	-0.00788	11558.88	0.716	0.716
Constant	9.977	0.902	0.000	0.000	8.5501	1088595	0.279	0.279
Participation in market								
Yield	0.0000228	0.0000178	0.202	0.202	-4.31e-06	3.08e-06	0.162	0.162
Distant to market	4.159	3.191	0.192	0.192	1.182	1.230	0.336	0.336
Access to market information	-5.166	722.934	0.994	0.994	8.912	691.523	0.990	0.990
Farming experience	-0.0380	0.0686	0.579	0.579	-0.007902	0.0278	0.776	0.776
Constant	1.221	722.964	0.999	0.999	0.991	1.410	0.482	0.482
Mills								
Lambda	-0.365	0.334	0.275		1.062749			
Rho	-0.860				1.00000			
Sigma	0.42385				1.0627492			
Lambda	-0.36463	0.334			1.0627492	1.235943		

* significant at 1%, ** significant at 5%, *** significant at 10%
Source: Field Survey, 2013

Heckman's two stage estimation results for market participation as a crop seller

Table 4: Heterogeneous impact of Ogbomoso zones for male and female Respondents in their Active years (18-59years)

	Ogbomoso Zones							
	Male				Female			
Variables	Coef.	Std. Err	P	Marginal effect	Coef.	Std. Err	P	Marginal effect
Outputsold								
Yield	1.90e-06**	8.65e-07	0.028	0.028	2.68e-06**	1.31e-06	0.041	0.041
Access to credit for fertilizers	-0.169	0.474	0.721	0.721				
Access to credit for seed	0.7000***	0.463	0.089	0.089				
Market information prior to sale	0.0200	0.128	0.876	0.876	-0.0745	0.2422	0.758	0.758
Farm size	0.1401	0.192	0.464	0.464	0.5854**	0.274	0.033	0.033
Age	0.0680***	0.0420	0.105	0.105	-0.0582	0.135	0.667	0.667
Age^2	-0.000963	0.0004814	0.045	0.045	0.00084	0.00151	0.578	0.588
School attended	-0.1448	0.105	0.167	0.167	0.512**	0.236	0.030	0.030
Household size	0.0819	0.0430	0.057	0.057	-0.129	0.121	0.286	0.286
Constant	9.9766	0.9019	0.000	0.000	11.254	3.370	0.001	0.001
Participation in market								
Yield	0.0000228***	0.0000177	0.205	0.020	**4.24e-06*** **	2.27e-07	0.062	0.062
Distant to market	4.159***	3.180	0.018	0.018	1.660***	0.945	0.079	0.079
Access to market information	-5.166	722.935	0.994	0.994	-0.594	0.551	0.281	0.281
Farming experience	-0.038	0.068	0.579	0.579	0.033	0.0386	0.396	0.396
Constant	1.221	722.946	0.999	0.998	-2.479	1.291	0.055	0.055
Mills								
Lambda	-0.365	0.3337	0.275		0.5877	0.675	0.384	0.384
Rho	-0.86028				-0.97416			
Sigma	0.42385				0.6033			
Lambda	-0.3646	0.3337			-0.58768	0.67493		

* significant at 1%, ** significant at 5%, *** significant at 10%
Source: Field Survey, 2013

From Table 4, the heterogeneous impact at zonal level reveals that for male respondents in their active age (productive), yield and distance to the nearest market have a substantial impact on the probability of participation in markets. The reason being that value of crop produced is a very important factor determining the degree of crop market participation, because of the possibility of higher marketable surplus.Distance to nearest market increases or reduces likelihood of participation because of increased or reduced marketing costs. Therefore all effort at increasing the yield should be encouraged which includes simultaneous access to institutional support services of credit, input supply and extension.

Table 5: Heterogeneous impact of Oyo zones for male and female Respondents in their Active years (18-59years)

	Oyo Zones							
	Male				Female			
Variables	Coef.	Std. Err	P	Marginal effect	Coef.	Std. Err	P	Marginal effect
Outputsold								
Yield	**1.23e-06*** **	8.35e-07	0.008	0.008	**2.06e-06*** **	1.12e-06	0.066	0.066
Access to credit for fertilizers	0.5191	0.4423	0.241	0.241	-0.215	0.6805	0.752	0.752
Market information prior to sale	0.582	0.573	0.310	0.310	0.361	0.8367	0.666	0.666
Farm size	0.4661	0.2845	0.101	0.101	0.462	0.298	0.121	0.121
Age	0.0566	0.1905	0.766	0.766	0.105	0.203	0.605	0.605
Age^2	-0.000547	0.00197	0.781	0.781	-0.00113	0.002102	0.589	0.589
School attended	0.1863	0.1801	0.301	0.301	0.3122	0.2987	0.296	0.296
Household size	-0.00788	0.0492	0.873	0.873	-0.230***	0.1265	0.069	0.069
Constant	8.550	4.635	0.065	0.065	9.0485	5.165	0.080	0.080
Participation in market								
Yield	**-4.31e-06** **	3.08e-06	0.162	0.016	0.0000259	0.0000129	0.045	0.045
Distant to market	1.182	1.230	0.336	0.336	4.543	4.937	0.357	0.357
Access to market information	8.912	691.523	0.990	0.990	-0.949	1.489	0.524	0.524
Farming experience	-0.007902	0.0278	0.776	0.776	0.1025	0.0987	0.299	0.299
Constant	0.991	1.410	0.482	0.482	-10.306	7.308	0.159	0.159
Mills								
Lambda	1.0627				-0.51767	0.49366	0.294	0.294
Rho	1.00000				-0.84343			

Sigma	1.06275		0.6138	
Lambda	1.06275	1.2359	-0.517666	0.4936616

* significant at 1%, ** significant at 5%, *** significant at 10%
Source: Field Survey, 2013

From Table 5 above the gender impact reveals that a yield is significant for male and household size whereas it is not for the female respondent. This may be due to the size of the female respondent and at the same time the fact that the household labour will be available more for the male than the female respondents. All effort at increasing the yield should be encouraged which includes simultaneous access to institutional support services of credit, input supply and extension.

7. Test of hypotheses

The hypothesis that, access to institutional support services have no significant effects on smallholder farmers crop production and market participation. Tables 2, 3, 4& 5 stated the significant levels of these explanatory variables. Access to credit and input supply for fertilizer was significant at 10 per cent level respectively. Therefore the hypothesis that access to institutional support service has no significant effect on crop productivity and smallholder market participation was rejected.

8. Conclusions

Increased volume of crop production per household, distance to the nearest market, farming experience, gender, years of schooling age of household head, and family size were found to be major determinants of both household participation in crop markets as a seller and also the extent of market participation. As the findings in this study clearly show, the role of access to institutional support services in this regard is quite critical, implying the need to significantly expand and strengthen the institutional support services to make them more easily and widely accessible to smallholder farmers.

The post estimation results confirm that households that could have access to support services can use inputs more intensively and increase their crop production, and their total volume of crop produce. Surplus products attained through the increased volume of production help farmers to participate in crop markets as sellers

Ultimately, this study strengthens the existing notion that smallholders' simultaneous access to well integrated institutional support services of credit, input supply of fertilizers and agrochemicals and extension services is crucial in getting farmers to participate both in input and output markets for a better income through intensified and market oriented agriculture.

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