The Impact of Agricultural Insurance Scheme on the Crop Farmers' Assets in Ondo State, Nigeria

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Abstract: Agricultural production activities are faced with a myriad of risks and uncertainties which require agricultural insurance management. In the event of losses, the insurance company is expected to pay an appropriate compensation enough to keep the insured farmer in business. The research work was carried out to investigate the impact of agricultural insurance scheme on crop farmers' assets in the study area. This was done through examining: the socio- economic characteristics of the crop farmers; the differences between the value of farmers' assets before and after insurance; and the factors affecting the value of the insured farmers' assets. A random sampling procedure was adopted to select 120 respondents from the list of insured crop farmers with the Nigerian Agricultural Insurance Scheme in the study area. The data needed were collected from the respondents with a well-structured questionnaire. Descriptive statistics and inferential analyses such as t-test analysis and regression analysis were employed to analyse the data. The research work revealed that the mean age of the insured crop farmers was 59.89 years while 77.5 percent were male. Also, 85 percent of the respondents had at least secondary school education. The majority (91.7%) operated commercial agriculture with the mean farming experience of 17.94 years. All (100%) the respondents had access to loan and 55.8 percent took the insurance policy because of indemnities coverage. In addition, the majority of the farmers noticed increase in their assets, farm size and output per hectare. The main determinants of respondents' assets value were, age, household size, years spent in school, farming experience, and main type of production technique used. The average value of agricultural assets among the respondents increased from ₦280686.2 before insurance to an average of ₦3231396 after insurance while that of non-agricultural assets rose from ₦3169860 to an average of ₦10730780. Both differences were significant at 1 percent. It is recommended that the youths, women, illiterates and peasant farmers should be sensitized and encouraged to participate in agricultural insurance scheme in order to manage the risks and uncertainties affecting agricultural production.

Keywords: Agriculture, insurance, risks, indemnity, assets

Introduction

Agriculture is the livelihood of most of the rural people in Nigeria. About 70 per cent of the rural people are subsistence smallholder farmers that produce about 90 per cent of Nigeria's food on un-irrigated and fragmented land wholly dependent on rainfall (International Fund for Agricultural Development (IFAD), 2015). In Nigeria, agriculture is rain –fed and due to the effects of climate change which causes erratic rainfall and prolong drought, agricultural produce is being affected leading to a decrease in the national value of agricultural production. The weather condition is highly affecting agricultural sector and losses of agricultural produce will likely increase in the future as natural disasters become more frequent (Inter-Governmental Panel on Climate Change (IPCC), 2012). Agriculture is a risky enterprise particularly in developing countries (Akcaoz and Ozkan, 2005). This is because agricultural activities are subjected to a wide range of variable economic and biophysical environment (Ullah

et al., 2016). When these risks lead to decrease in farm incomes, they can adversely affect the economic welfare of farmers, and also constrain future investment and growth of farm businesses (Ullah *et al.,* 2016).

According to Organisation for Economic Co-operation and Development (OECD) (2008) we have five types of agricultural risk:

- Market or price risk – uncertainty about future changes in prices of both inputs and outputs due to shocks, trade policy, new markets, etc.;

- Production or yield risk – uncertainty about the quantity from agricultural production arising from weather related factors (e.g. hail, frost, floods, droughts), crop and livestock diseases and pests, and changes in technology, etc.;

- Institutional or regulatory risk – uncertainty regarding the regional or national policy and legal environmental for agriculture;

- Financial – uncertainty about financial flows within a business due to variability in interest rates, access to credit and value of financial assets; and

- Personnel risks – uncertainty due to personnel hazards, such as injury, illness, or death.

There are two main strategies to manage risks; the on-farm strategies and strategies to share risk with others. According to Huirne *et al.,* (2000) the three ways to share risk with others are; Insurance, farm financing and contractual agreements. Insurance as one of the tools available in risk management operates on the principles of risk pooling. Agricultural insurance is defined as a contractual business that guarantees financial protection against potentially large loss in return for a premium. If the insured experiences a loss event, then the insurer pays out a previously agreed amount (United Nation Office for Disaster Risk Reduction (UNISDR), 2009). It can also be defined as the stabilization of income, employment, price and supplies of agricultural products by means of regular and deliberate savings and accumulation of funds in small instalments by many in favourable time periods to defend some or few of the participants in bad time periods (Arena, 2005).

Most of the rural farmers cannot afford to pay the premium requested of them by the insurance company due to their low level of production and some socio-economic factors. To reduce the vulnerability of farmers to risk and to improve yields, many countries have introduced and implemented agricultural insurance programmes to assist farmers to manage and cope with risks (Abebe and Bogale, 2014). Agricultural insurance against natural hazards is often publicly supported by the state either in the form of premium subsidies or by creating public private partnerships (Bielza *et al.,* 2009).

The Nigerian agricultural insurance corporation (NAIC) was established by the Federal Military Government on the 15th of December 1987. The broad objective of the Nigerian Agricultural Insurance Scheme (NAIS) is to give protection to the farmers from the effects of natural disasters and to ensure payment of appropriate compensation enough to keep the farmer in business in the event of losses.

The scheme is designed specifically to:

1. give financial support and pay appropriate compensation to farmers affected by natural disasters;

2. increase the flow of agricultural credits to farmers from lending institutions;

3. promote agricultural production since it would enhance greater confidence in farmers to adopt new and improved farming techniques, thereby increasing the total production; and

4. reduce or eliminate the need for emergency assistance provided by Local, State and Federal Governments during the period of agricultural disasters.

Aidoo *et al.*, (2014) also emphasized that one of the benefits of agricultural insurance is to expand agricultural output. This is possible because the policy holders (insured farmers) are assured of a certain income in a case of crop and livestock failure. This has given them confidence to take more risk in their endeavor to increase agricultural production. In spite of the importance and benefits of insurance as a tool that can reduce the impact of production risk, effects of climate risks are still prevalent among farming households in developing countries. Most often the effects of these risks are felt by poor vulnerable subsistence farmers in rural communities (Aidoo *et al.*, 2014).

Due to risks inherent in agricultural production, there is need to encourage farmers to get their farming business insured. Since this will involve them paying certain premium to the insurance company, there is a need to have enough evidence to prove to the farmers the benefits of insurance. This will also help them to adopt new innovation as most subsistence farmers are afraid of loss, which is resisting them from adopting these innovations. Also, the introduction of agricultural insurance has continued to create an intense attention among academics and politicians because of the volume of investment involved (Olubiyo, 2009). Even some authors have criticised subsidised crop insurance on several counts (Skees *et al.*, 2005).

The main objective of this study is to examine the impact of agricultural insurance scheme on crop farmers' assets in the study area. This will be carried out through examining; the socio-economic characteristics of the insured crop farmers; the differences in the value of crop farmers assets before and after being insured; and the factors affecting the value of the respondents assets after insurance will be determined.

Research Methodology

The Study area

The study was conducted in Ondo State. The state lies between Latitudes 5^045^1 and 7^052^1N and Longitudes 4^020^1 and $6^0 05^1$ E. It is bounded by Ogun and Osun States on the West, Ekiti and Kogi States on the North and on the South by the Bight of Benin and Atlantic Ocean. The State lies in the rainforest zone of Nigeria. Agriculture is the main occupation of its inhabitants. The climate of the state is tropical with two distinct seasons: the raining season which usually occur between April and October and the dry season that usually start from November to March.

Sources of Data

The primary data which constituted the basis of the analysis were collected with the aid of detailed and

structured questionnaire with open and close ended questions. A random sampling method was used to select a total of one hundred and twenty (120) farmers from the records of the Nigerian Agricultural Insurance Scheme in the study area.

Analytical Techniques

In order to achieve the stated objectives, descriptive analysis such as frequency distribution, percentage and mean were used. The data was also subjected to t-statistics, and also regression analysis. The data were subjected to four (4) functional forms

during regression analysis and the one producing the best fit was chosen based on econometric criteria, theoretical criteria, statistical criteria, and a priori expectation. The four (4) functional forms are; (i) linear function, (ii) semi log (iii) Cobb Douglas and (iv) exponential function.

The impact of insurance scheme on the insured farmers' assets value was determined using t-test formula. The t-test statistics used to test the significant differences of the means was calculated as follows in equations 1 and 2:

$$t = \frac{\overline{X_1} - \overline{X_2}}{\sqrt{\left[\frac{S_{x_1}^2(n_1-1) + S_{x_2}^2(n_2-1)}{n_1+n_2-2}\right]\left[\frac{1}{n_1} + \frac{1}{n_2}\right]}} \dots \dots \dots \dots \dots (1)$$

$$S^2 = \frac{1}{n-1}\left[\sum_1^{120} fX^2 - \frac{(\sum fX)^2}{n}\right] \dots \dots \dots \dots \dots \dots \dots \dots \dots (2)$$

Where:

t= t statistics

$\overline{X_1}$ = the mean value of crop farmers assets before being insured

$\overline{X_2}$ = the mean value of crop farmers assets after being insured

$S_{x_1}^2$ = variance of value of assets before being insured

$S_{x_2}^2$ = variance of value of assets after being insured

n_1 = sample size of respondents before being insured

n_2 = sample size of respondents after being insured

Model specification

Implicitly the model is stated as:

$Y = F(X_1, X_2, X_3, X_4, X_5, X_6, X_7 \, U_i) \dots \dots \dots \dots \dots (1)$

Where Y = Value of respondents' assets after being insured

X_1 = Sex (1, male; 0 female)

X_2 = Age in year

X_3 = Household size (number)

X_4 = Years spent in school

X_5 = Farming experience (year)

X_6 = Distance of farm to market (Kilometer)

X_7 = Main type of production technique used (1, capital intensive; 0, labour intensive)

U_i = Error term

The four functional forms tried are stated explicitly as:

Linear

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + e_i \dots (3)$

Semi-log

$Y = \beta_0 + \beta_1 LogX_1 + \beta_2 LogX_2 + \beta_3 LogX_3 + \beta_4 LogX_4 + \beta_5 LogX_5 + \beta_6 LogX_6 + \beta_7 LogX_7 + e_i \dots (4)$

Cobb Douglas

$LogY = \beta_0 + \beta_1 LogX_1 + \beta_2 LogX_2 + \beta_3 LogX_3 + \beta_4 LogX_4 + \beta_5 LogX_5 + \beta_6 LogX_6 + \beta_7 LogX_7 + e_i \dots (5)$

Exponential

$LogY = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + e_i \dots (6)$

Where:

$X_1 \dots X_7$ are as defined earlier.

$\beta_0 \dots \beta_7$ are the parameters to be estimated.

e_i = Error term

Results and Discussion

Findings on the socio-economic characteristics of the respondents are presented in Table 1. The results in Table 1 indicate that the crop farmers between 41 and 50 years accounted for 40.8 percent of the age distribution, 34.2 percent of the respondents were in the age range of 51 to 60 years while 25 percent were above 60 years. The mean age of the farmers was 59.89 years while the minimum and maximum were 47 and 77 years respectively. This shows that fewer crop farmers' youth are involved in the Agricultural Insurance Scheme in the study area. It implies that the aged are more interested in the scheme. This may be due to the fact that the aged farmers are aware of a myriad of risks facing agricultural production in the developing countries. The gender distribution of the respondents showed that male farmers had 77.5 percent and female farmers 22.5 percent. This shows that male farmers participate in agricultural insurance more than their female counterparts. This corroborates the findings of Emmanuella (2016) that male farmers are more willing to purchase crop insurance because most household heads are males and they own most of the land. He believed that women do not own land due to Africa culture, thus women work on land owned by their husbands.

The results also showed that 80 percent of the farmers were married, 10.8 percent were widowed and 9.2 percent were divorced. It shows that married individuals are more likely to purchase insurance policy since they have more responsibilities and would want to reduce the family's vulnerability to risks. This is supported by Danso-Abbeam *et al.*, (2014) that affirmed that married farmers are more willing to take part in insurance programme. Half of the respondents (50 percent) had tertiary school education, 15 percent had primary school education, while 35 percent had secondary school education in the study area. The distribution thus shows that the level of education of the farmers may have influenced their level of awareness as to how best to reduce the effects of agricultural production risks. This is also in line with Hill *et al.*, (2013) study that revealed that educated farmers are more likely to purchase insurance.

Table 1 shows that, 10.8 percent had less than 11 years farming experience, while 60 percent had between 11 and 20 years of experience, and 29.2 percent had over 20 years of farming experience. The mean, minimum and maximum farming experience were 17.94, 7 and 30 years respectively. This shows that the farmers that do embrace insurance scheme are more experienced. In addition, 91.7 percent (Majority) of the farmers engaged in commercial farming, while 8.3 percent engaged in peasant farming system. This shows that commercial farming is mostly practised by the insured farmers. This may be due to the fact that agricultural insurance has boosted the confidence in farmers to adopt new and improved farming techniques. About 27.5 percent grew only arable crops, 16.7 grew only tree crops, while 55.8 percent grew both arable and tree crops on their farms. This shows that the Nigerian Agricultural Insurance Scheme (NAIS) is accessible to all groups of crop farmers.

Table 1: Socio-economic characteristics of the respondents

Variable	Frequency	Percentage
Age (year)		
41-50	49	40.8
51-60	41	34.2
61-70	19	15.8
Above 70	11	9.2
Sex		
Male	93	77.5
Female	27	22.5
Marital status		
Married	96	80.0
Divorced	11	9.2
Widowed	13	10.8
Educational level		
No formal education	0	0
Adult education	0	0
Primary school education	18	15.0
Secondary education	42	35.0
Tertiary education	60	50.0
Farming experience (Year)		
<11	13	10.8
11-20	72	60.0

Variable	Frequency	Percentage
>20	35	29.2
Farming system practiced		
Commercial	110	91.7
Peasant	10	8.3
Types of crop grown		
Arable crops	33	27.5
Tree crops	20	16.7
Both	67	55.8
Reason for participating in insurance		
Accessibility to loan	23	19.2
Aversion of risk	28	23.3
Indemnities coverage	67	55.8
Accessibility to subsidy	2	1.7
Access to loans		
Yes	120	100.0
No	0	0.0
Increase in farm size after participation		
Yes	120	100.0
No	0	0.0
Increase in assets after participation		
Yes	116	96.7
No	4	3.3
Increase in output per hectare after participation		
Yes	120	100.0
No	0	0

Source: Field Survey

Furthermore, Table 1 indicates that 19.2 percent participated mainly in insurance scheme in order to have access to loans since the scheme encourages flow of agricultural credit from lending institutions to the farmers. Also, 23.3 percent participated to avert risk while the majority (58.5%) participated for indemnities coverage, and 1.7 percent participated for access to subsidy. This indicates that, awareness to insurance scheme is increasing as most farmers are now using insurance as a risk management tool. The analysis indicated that 100.0 percent of the respondents had access to loan. Since insurance guarantees protection against crop failure, the insured farmer has greater confidence in obtaining loans from any financial organisation.

According to Table 1, all (100%) the respondents experienced increase in their farm size after participating in the insurance scheme. This could be attributed to the fact that these farmers have access to loans facilities and over the years have built confidence in using new technologies and making greater investments in agriculture. Results in Table1 show that the majority, 96.7 percent, of the respondents had the value of their assets increased after participation while 3.3 percent said there was no increase in the value of their assets. This indicates that insurance scheme makes life better for the farmers in the study area. All the respondents confirmed that their farm output per hectare increased after participating in the insurance scheme.

Determinants of insured crop farmers' assets value in the study area

Table 2 shows that out of the four functional forms tried the linear equation had the highest coefficient of multiple determination (R^2) and number of significant explanatory variables, hence chosen as the lead equation. The coefficient of multiple determinations (R^2) was 0.843 indicating that about 84 percent of the total variations in the farmers' assets value were successfully explained by the explanatory variables included in the model and the remaining 16 percent were explained by the random error. Moreover, farming experience, household size, years spent in school, and distance of farm to market had positive coefficients, this implies that a unit decrease (increase) in each of the variables would decrease (increase) the farmers' assets value, while age which had negative coefficient implies that a unit decrease (increase) would increase (decrease) the assets value. Also, sex variable with positive sign implies that the male respondents are wealthier than their female counterparts while the main type of production technique used variable with positive sign shows that the use of capital intensive method of production

increases the value of the respondents' assets than the use of labour intensive method of production.

Hence, the main determinants of the respondents' assets value were age X_2, household size X_3, years spent in school X_4, farming experience X_5, and main type of production technique used X_7. These variables were significantly different from zero at 1 percent, 5 percent or 10 percent level of significance. Age X_2, years spent in school X_4 and farming experience X_5 were significant at 5 percent, while household size X_3 was significant at 10 percent and main type of production technique used X_7 was significant at 1 percent.

Table 2: Regression analysis for crop farmers

Parameter	Linear	Semi Log	Cobb Douglas	Exponential
Constant	0.532***	0.534*	0.946	1.341
	(3.079)	(1.701)	(1.074)	(0.642)
Sex (X_1)	0.053	0.054	0.107	0.107
	(0.459)	(0.457)	(0.913)	(0.927)
Age (X_2)	-0.031**	-0.032	0.590***	0.057
	(1.993)	(0.266)	(2.786)	(0.474)
Household size (X_3)	0.184*	0.199**	0.190**	1.680*
	(1.931)	(2.119)	(2.028)	(1.765)
Years spent in school (X_4)	0.027**	0.106	0.118	0.068
	(2.398)	(1.126)	(1.252)	(0.721)
Farming experience (X_5)	0.42**	0.012	-0.014	0.450
	(2.359)	(1.131)	(1.470)	(0.427)
Distance of farm to market (X_6)	0.43	0.011	0.240	0.027
	(1.447)	(0.113)	(0.252)	(0.278)
Main type of production technique used (X_7)	0.034***	0.083*	0.087	0.041
	(4.364)	(1.838)	(0.878)	(0.440)
R^2	0.843	0.462	0.368	0.487

***, ** and * coefficients are significant at 1%, 5% and 10% levels of significance respectively. Figures in parenthesis are t-values.

Impact of agricultural insurance scheme on farmers assets before and after insurance

Table 3 shows the respondents' value of agricultural assets and non- agricultural assets before and after insurance. According to Table 3, the average value of agricultural assets among the respondents increased from ₦280686.2 before insurance to an average of ₦3231396 after insurance. The difference in means was significant at 1 percent.

Table 3: T-Test of the respondents' value of assets before and after insurance

Variable	Before insurance value (₦)	After insurance value (₦)	T-test
Agricultural assets acquired	280686.2	3231396	3.61***
Non- Agricultural assets acquired	3169860	10730780	4.58***

Note: ***significant at 1 percent level of significance

Also, the mean value of non-productive assets rose from ₦3169860 to an average of ₦10730780 after participating in the insurance scheme. This difference was also significant at 1 percent level of significance. The implication of this is that the scheme favours acquisition of agricultural and non-agricultural assets among the crop farmers in the study area. It shows that positive impact of agricultural insurance scheme on the assets of crop farmers has been recorded in the study.

Conclusion and Recommendations

The importance of agricultural insurance in managing risks plaguing agricultural activities cannot be over emphasized. Agricultural risks are common all over the world because agricultural production is characterized with uncertainty and risk due to uncontrollable factors, such as weather. Hence, the need for a good manager of risks and uncertainties in agriculture.

The socio-economic characteristics of the respondents were examined by descriptive statistics, while the differences in the value of crop farmers' assets before and after being insured were subjected to an inferential analysis. Also regression analysis was

used to determine the factors affecting the value of the respondents' assets after insurance. The study shows that the majority of the crop farmers are male and of age with tertiary education. About 60 percent of the respondents have between 11 and 20 years of farming experience. Also, 91.7 percent are into commercial agriculture and more than half (55.8%) grow both arable and tree crops. Most respondents participate in the insurance scheme because of the indemnities coverage.

The majority of respondents experience, increase in, farm size, assets and output per hectare while the value of their assets is determined mainly by age, household size, years spent in school, farming experience, and main type of production technique used. The average value of agricultural assets among the respondents increased from ₦280686.2 before insurance to an average of ₦3231396 after insurance, while that of non- agricultural assets increased from ₦3169860 to an average of ₦10730780. The study recommends that:

• Youths and women in agriculture should be sensitized and encouraged to participate in agricultural insurance scheme in order to manage the risks and uncertainties affecting agricultural production.

• Also the illiterates among the crop farmers should be encouraged to take up agricultural insurance policy in order to enhance their agricultural activities.

• Since participating in agricultural insurance scheme leads to increase in farm size, assets and output per hectare, peasant farmers should be educated on the benefits and mode of operation of the insurance scheme. This could be done through extension agents, contact farmers and opinion leaders.

• Capital intensive method of production should be encouraged among farmers because it is the most significant determinant of farmers' assets value.

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