# EMPIRICAL ANALYSIS OFCEREALS FARMERS' WILLINGNESS TO CONTINUE THE USE OF AGRICULTURAL INSURANCE SCHEME IN NIGER STATE, NIGERIA

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## ABSTRACT

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*Risks and uncertainties associated with farming enterprises are to an extent undermining the productivity and sustainability of agricultural sector in Nigeria. This study was carried out to determine the factors influencing small scale cereal farmers' willingness to continue use of agricultural insurance scheme in Niger State, Nigeria. A multistage sampling procedure was employed to select a sample size of 80 and structured questionnaires were used to obtained data from the farmers. The data collected from the farmers were analyzed using descriptive statistics and probit regression model. The findings revealed that cereal farmers were in their productive years with a mean age of 37 years. They are experienced farmers with an average farm size of 2 hectares. The major risks encountered by cereal farmers were fire outbreak and insects/diseases infestations. The probit regression showed that age, farm size and output were significant variables that influenced the willingness of cereal farmers to continue using agricultural insurance scheme. The major constraint limiting cereal farmers' participation in agricultural insurance schemes was delay in indemnity payment. It is recommended that farmers should be indemnified appropriately by insurance service providers this will ensure continuity of farmers' participation in agricultural insurance.*

## INTRODUCTION

Cereals are one of the major crops of West Africa; they are as well a major contributor to agriculture and food security in Nigeria. They consists of between 55 and 60% of subsistence farmers output and provide incomes as well as form the basis of many households diets both in rural and urban areas (Balami*et al*., 2011). The important cereals cultivated are maize, millet, sorghum, rice, acha and wheat. These crops are popular crops for Nigeria's agricultural and economic development. They have established themselves as a very significant components of the farming system and determine the cropping pattern of the predominantly peasant farmers especially in the Northern states (Ahmed 1996, FAO, 2001).Apart from the fact that cereal crops are widely cultivated in Nigeria, Ismaila*et al*., 2010, identified them as the major dietary energy supplier all over the world and particularly in Nigeria. Betru and Kwashima (2011) further stated that these crops are essential part of nutrition in Africa, as well as in other continents, constituting large portion of daily food energy.

Nigerian farmers are increasingly faced with risk factors such as droughts, floods, diseases, pests, windstorms, accidents, fire, theft, damage and several other unplanned events whose occurrence cannot be readily predicted and therefore are serious threat to the success of farming enterprise in Nigeria (Eleri*et al*., 2012).Patrick(2010) opined that since farmers cannot predict the probability of occurrence of any of these and cannot bear the risk and uncertainties alone, they are faced with the options of transferring or sharing the risks involved in the day-to-day management of their farms with one or more individuals or firms.Agricultural insurance policy is one of the notable tools by which farmers can share or transfer the risks and uncertainties associated with the farming enterprise as it encourages them to make greater investment in agricultural production. It promotes their confidence in venturing into adoption of new and improved farming practices, enhances their accessibility to credit by financial institutions as the insurance cover as an added collateral and ultimately provide financial support to farmers in the form of indemnity which ensures continuity of their farming enterprise. Although crop insurance exists in Nigeria, it covers less than 1% of the total population of farmers (Eleri*etal*., 2012).

Philips (1988) and Olubiyi*et al*., (2009) identified the problems associated with farmers unwillingness to use insurance cover despite associated risks.They includevery low incomes, small farm holdings, large scale ignorance, poverty and the adverse view of other peoples' experiences with activities of insurance companies in other sectors. They further noted that peasant farmers are generally reluctant to patronize the insurance market let alone willingly forgo a small payment in the form of premiums in exchange for their farm risks.

Therefore, this study examines the factors affecting small scale cereals farmer's willingness to continue using agricultural insurancein the study area. The specific objectives are to: identify the socio-economic characteristics of small scale cereal farmers in the study area; identify risks in cereal crops production; determine factors influencing cereals farmers' willingness to continue using agricultural insurance and identify constraints encountered by small scale cereal farmers with insurance cover.

## METHODOLOGY

### Study Area

Niger state is located in North Western part of Nigeria and covers a total land area of 76,000 square kilometre or about 9 percent of Nigeria's total land area.This makes the State the largest in Nigeria. The State capital is Minna and other major cities are Bida, Kontagora, and Suleja. The State lies in the Guinea Savannah vegetation of the country with favorable climatic conditions for crops and livestock production, by reason of its location and its climate , soil and hydrology, Niger State has the capacity to produce most of Nigeria's stable crops. It falls between latitude $8^0 20^1$N to $11^0 30^1$N and longitude $3^0 30^1$E to $7^0 20^1$E. The state experiences two distinct seasons: the dry and wet seasons, the annual rainfall ranges from about 1,600mm in the south to 1200mm in the north. The duration of the raining season ranges from 150-210days or more from the North to the South. Mean maximum temperature remains high throughout the year, hovering about $32^0$F particularly in March and June. However, the lowest minimum temperature occurs usually between December and January when most parts of the state come under the influence of the tropical continental air mass which blows from North. Dry season in Niger commences in October (Niger State GIS, 2007). The State also has 25 Local Government Areas, and a total population of 3,950,249 and about 85% of the state population are farmers (National Bureau of Statistics, 2006). The State has a total of 7million hectares of agricultural land, in which 33% is under cultivation; in addition there are 680,000 hectares of irrigable land with only 3.9% currently under irrigation farming (Niger State GIS, 2007).

### Sampling Procedure and Sampling Size

The study adopted a multi stage purposive sampling technique. Two (2) Local Government Areas was purposively selected based on their participation in Agricultural insurance, they include Lavun and Rafi. Four communities were randomly selected in each of the LGAs. The communities selected in Lavun are Edogi, Emi-Kuta, Pategi, and Tswasun while those selected in Rafi are Kagara, Rijau, Kuta, and Tafa. A total of eighty (80) questionnaires were administered to Ten (10) respondents that were randomly selected from each village resulting into a sample size of Eighty (80). Data collection lasted from April to June, 2013.Data used were collected with the aid of carefully designed structured questionnaires which were administered to the respondents in the study area.

### Analytical Techniques

The analytical tools used in this study were descriptive statistics and probit model. The descriptive statistics such as tables, frequencies, and percentage were used to describe socio-economic characteristics, and constraints encountered by small scale cereal farmers with insurance cover.

### Probit Model

The probit model as used by Alabi*et al.*, 2014 is usually represented thus:

$$\text{Prob}(Y=1)=1-F[-\sum_{k=1}^{k}\beta_k b_k] =F[-\sum_{k=1}^{k}\beta_k b_k]=\phi[-\sum_{k=1}^{k}\beta_k b_k] \quad \ldots\ldots(1)$$

The equation for probability of non-event is then

$$\text{Prob}(Y=0)=1-\phi[-\sum_{k=1}^{k}\beta_k b_k] \quad \ldots\ldots(2)$$

The farmers' decision to continue using agricultural insurance depends on the function.

$$Y^*=\mu Z_i + u_i \quad \ldots\ldots(3)$$

$Y^*$=underlying index reflecting the difference between willingness to continue using insurance and its non-willingness.

$\mu$=vector of parameters to be estimated

Zi=vector of exogenous variables which explain willingness of use of insurance

Ui=standard normally distributed error term.

Given the farmers assessment, which Yi* crosses the threshold value, 0, cereals farmers are willing to use insurance. In practice, Yi which is defined by:

Yi=1 if Yi*>0 (farmers willing to continue using insurance)

Yi=0 if otherwise

In the case of normal distribution function, the model to estimate the probability of a farmer willingness to use insurance can be stated thus:

$$P(Yi=\frac{1}{X}) = \phi(X\beta)=\int_{-\alpha}^{X\beta}\frac{1}{\sqrt{2\pi}}\exp(\frac{-Z2}{Z})dz \quad \ldots\ldots(4)$$

Where,

P = Probability of the ith farmers willingness to use insurance and 0 otherwise

X = K by 1 vector of the explanatory variables

Z = standard normal variable (i e $Z \sim N(0,\delta^2)$) and

$\beta$ = K by 1 vector of the coefficients estimated

For a non-dichotomous variable, the marginal probability is defined by the partial derivative of the probability that Yi =1 with respect to that variable. For the jth explanatory variable, the marginal probability is defined by

$$\frac{\delta p}{\delta x_{ij}} = \phi.(X_i\beta)\,\beta_j \quad \ldots\ldots 5$$

Where, $\phi$. = distribution function for the standard normal random variable
$\beta_j$ = coefficient of jth explanatory variable
The probit model specification in this analysis can be expressed as:
$Yi^* = X_i\beta+\varepsilon i$.....6
$Y_i = 1$ if $Y_i^* > 0$, 0 if $Y_i^* < 0$
Where,
$Y_i$ = observed dichotomous dependent variable which takes value 1 when the ith cereal farmers is willing to continue using insurance and 0, otherwise.
$Y_i^*$ = underlying latent variable that indexes uses of insurance
$X_1$ = Age of farmers (years)
$X_2$= Household size (No.)
$X_3$= Educational level (No.)
$X_4$= Farming experience (Years)
$X_5$=Farm size (Hectares)
$X_6$= Output (Kg)
$\beta$ = K X 1 vector of parameters to be estimated
$\varepsilon i$ = Error term which is assumed to have standard normal distribution.

## RESULTS AND DISCUSSION

### Socio-economic Characteristics of Sampled Cereals Farmers

The results from Table 1 show that the mean age of cereal crops farmers in the study area was about 37 years. This means that these farmers are young and in their productive years. They are likely to adopt new innovations like agricultural insurance and will continue to use such as they grow older.The average household size is 12, indicating that majority of the respondents have a large family. The effect of this could be positive or negative on farmer's willingness to continue using agricultural insurance. Large and productive members might result in the expansion of production which may lead to more income for the farming households. On the other hand, large and unproductive farming households will lead to less productivity and less income from farming which may lead to farmers' unwillingness to continue using agricultural insurance.The mean year of schooling by the sampled farmers is 8, this means that majority of them had at least a primary education. The implication is that educated farmers will likely be more aware and willing to take an insurance policy. This finding is in consonant with those of Farayola*et al.*, 2013 in which they found out that the higher the educational level of farmers, the higher their participation in agricultural insurance scheme.Majority of cereal crops farmers had about 15 years of experience in the production of cereals; with an average farm size of about 2 hectares. The average output/kilogramme was 1825.

### Risks in Cereal Farming business

The result in Table 2 showed that 87.5% of loss occurrence was due to the outbreak of natural element such as fire, pest, and disease, 61.3% as a result of social element (theft) and 53.8% as a result of economic factors such as price fluctuation. Adegeye and Okunmadewa (1998) observed that most analyst call theft a social risk, but in their view, the extent to which they affect the total yield of crops and livestock (especially when theft is at growing stage, substantial and not detected) make it a major farm hazard to reckon with. The results on table 2 indicate that cereal crops production in the study area was risky.

Table 1: *A priori* Expectation and Average Statistics of Sampled Farmers

| Variables | A priori expectation | Average |
|---|---|---|
| Age (years) | +/- | 36.987 |
| Household size (No.) | +/- | 12.375 |
| Educational level (years) | + | 8.43 |
| Farming experience (years) | +/- | 15.787 |
| Farm size (Ha) | + | 1.837 |
| Output (Kg) | + | 1825 |

Table 2: Distribution of respondent according to risks encountered in cereal farming

| Nature of loss | Frequency * | Percentage |
|---|---|---|
| Natural element (Fire, Insect/disease etc) | 70 | 87.5 |
| Social element (theft) | 49 | 61.25 |
| Economic factor (price fluctuation) | 43 | 53.75 |

Source: Field Survey, 2013; *=Multiple responses

The parameters of the Marginal effect after probit regression model were estimated using probit function. The chi square statistics (prob> $chi^2 = 0.1969$) showed that the probit model gave the best fit for the analysis. The result of the probit regression in table 3 shows that the farmer's age, farm size, and output of the farmers were significant variables that influenced small scale cereals farmers' willingness to continue using Agricultural Insurance scheme in Niger State. The coefficient of age of cereal farmers was negative and significant at 5% level of probability, this implies that the older the farmers, the lower the probability of participation in agricultural insurance scheme.

This result is consistent with the findings of Mishra and Godwin (2006). The coefficient of farm size was negative and significant at 10% level of probability, this result does not conforms to the a priori expectation that the more the farm size of cereal farmers, the higher their participation in agricultural insurance scheme. However, the coefficient of cereal output was positive and significant at 10% level of probability, implying that the more the output, the higher the likelihood of participation in insurance scheme

Table 4 shows that the probability of a cereal crop farmer to continue using agricultural insurance increases by 2% for every additional year added to household head age. On the other hand the probability of sampled farmers to continue using agricultural insurance decreases by 11% for every additional farm size added by the farmer. For every additional output gained by the farmers, the probability to continue using agricultural insurance will increase by 0.00026%.

Table 3: Probit regression result

| Variables | Co-efficient | Z- Value |
|---|---|---|
| Constant | -1.388901(-1.26) | 0.209 |
| Age of farmers ($x_1$) | -0.912416 (2.33) | 0.020** |
| Household size ($x_2$) | -0.0567628(-1.28) | 0.201 |
| Educational level ($x_3$) | 0.0062274 (0.21) | 0.832 |
| Farming experience ($x_4$) | -0.038071 (-1.17) | 0.241 |
| Farm size($x_5$) | -0.339407 (-1.61) | 0.106* |
| Output ($x_6$) | 7.99e-06 (1.59) | 0.112* |

Probability >chi2= 0.1969; (Adjusted R2); Pseudo R2 = 0.0897; F ratio; Log likelihood = -43.68792*Significant at 10% probability level; ** Significant at 5% probability level; Figures in parenthesis are T-values

Table 4: Marginal Effect of Probit Model

| Variables | Co-efficient | Z- Value |
|---|---|---|
| Age of farmers ($x_1$) | 0.0290998 (2.33) | 0.020** |
| Farm size ($x_5$) | -0.113269 (-1.65) | 0.099* |
| Output($x_6$) | 2.69e-06 (1.61) | 0.106* |

*Significant at 5% probability level; **Significant at 10% probability level; Figures in parenthesis are T- values

**Constraints encountered by Insured Farmers**

Table 5 shows the constraints encountered by cereal crops farmers in their participation in Agricultural Insurance Scheme; the major problem encountered by the farmers was that of delay in indemnity payment which is ranked first. The payment of indemnity by insurance companies was indicated to be untimely and insufficient by most of the farmers and this affected their view about Agricultural Insurance Scheme as they tended to believe that insurance companies are only interested in collecting premium and not paying indemnity when due. Untimely delay in assessment of losses by insurance companies which was ranked as the second problem faced by the farmers in their participation in insurance scheme, most farmers complained about the insurance companies not sending insurance personnel to come for inspection at the time of accident. Inaccessibility to insurance personnel, inadequate information dissemination and administrative bottlenecks were ranked third, fourth and fifth constraints identified by the sampled farmers as militating against the operations of agricultural insurance respectively. These findings are similar with those of Abdumalik*et al*; 2013. These constraints have the tendency of making the farmers withdraw from insurance scheme because it tends to carry them away from their farming business.

Table 5: Constraintsencountered by insured farmers

| Constraints | Frequency* | Percentage | Rank |
|---|---|---|---|
| Delay in payment | 60 | 24.89 | 1st |
| Delay in assessment of losses | 51 | 21.16 | 2nd |
| Inaccessibility to insurance personnel | 50 | 20.75 | 3rd |
| Inadequate information disseminated | 44 | 18.26 | 4th |
| Administrative bottlenecks | 36 | 14.94 | 5th |

Source: Field Survey, 2013; *Multiple responses

## CONCLUSION AND RECOMMENDATIONS

Majority of cereals farmers are aware of agricultural insurance in the study area and are willing to continue to use insurance as a precaution against risks associated with production. Based on the result of the research the following recommendationswere suggested. It is recommended that farmers should be indemnified appropriately by insurance service providers. There is the urgent need to improve the operational efficiency and reduce the delay in settlement of claims. The Federal Government of Nigeria should speed up the de-monopolization of agricultural insurance by NAIC, such that other private insurance companies can participate so that more farmers could be covered.

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