FACTORS INFLUENCING HOLDING OF DROUGHT INSURANCE CONTRACTS BY SMALLHOLDERS IN BUNDA

Phillip Daniel Daninga
1. Information Analysis and Evaluation Division, Agricultural Information Institute, Chinese Academy of Agricultural Science
No.12 South Zhongguancun St. Beijing 100081, China.
Mob: +86 13121588373, Email: daningap@yahoo.com
2. Department of Economic Studies, The Mwalimu Nyerere Memorial Academy
Dar es salaam, Tanzania

Zhang Qiao
Information Analysis and Evaluation Division, Agricultural Information Institute, Chinese Academy of Agricultural Science
No.12 South Zhongguancun St. Beijing100081, China

ABSTRACT: *The objective of this study was to understand factors influencing farmers' holding of drought insurance contracts. Using questionnaires, a cross sectional survey with 410 randomly selected household heads was conducted to cotton growers from three wards of Bunda district in Tanzania, involving farmers who were in the program and non-participating farmers. Results from logistic regression analysis indicated that, perception of respondents about the drought incidence occurrences, household that previously suffered loss due to drought and the productive age with more experience in farming had negative influence on holding of drought insurance contract in the study area. Farmers' needs should be considered and adequately incorporated into technical arrangements of program implementation to improve participation of farmers in the drought insurance program.*

KEYWORDS: Cotton growers, Drought insurance, Contract holding, Tanzania

INTRODUCTION

Majority of the people in Tanzania, approximately 80%, live in rural areas and their occupation for livelihood is mainly agriculture (Akyoo *et al.*, 2013; IFAD, 2014). This sector in the country is predominantly characterized by small scale subsistence farming (Munishi *et al.*, 2010), whereby over eighty per cent of land that is arable is used by small scale farmers whereas about one and a half million hectares are utilized for medium and large scale farming (IFAD, 2014). Like other farmers in developing countries, smallholder producers in Tanzania are exposed to many types of risks, especially in semi-arid areas (Akyoo *et al.*, 2013). Such risks are heavy dependence on hand hoe and reliance on rain-fed agriculture (IFAD, 2014), which is biological in nature depending overly on weather and natural environmental conditions (Akyoo *et al.*,

ISSN: 2053-2199 (Print), ISSN: 2053-2202(Online)

2013). Unfortunately majority of farmers in the country who rely in agriculture have been prone to recurrence drought, the most important threat to agricultural production causing severe impacts on farmers livelihoods due to loss in crops and reduced incomes for farmers (Shiferaw *et al.*, 2014). Input costs and price fluctuations add on production risks that farmers are faced with. However, farmers do not have security as they are threatened with natural factors that reduce the quantity of their produces (Rashidpour, 2013).

One of the solutions that producers can use to mitigate their risks is crop insurance (Seyed *et al.*,2010). Aiming at protecting farmers against various risks like low crop yields, unpredictable rainfall, poor prices, and loss of livestock, agricultural insurance products come in an arrangement that might be different from one another (Seyed *et al.*, 2010; Ankolekar & Janz, 2012). However, most of these programs in developing countries are meant not only to provide farmers with an alternative risk hedging tool, but also to improve farmers' access to credit, helping farmers produce high-value crops as well as stabilizing production in agriculture and the associated agribusinesses (Rashidpour, 2013).

When faced with risks in their farming endeavours, farmers can use crop insurance as one of the alternative tools to mitigate risks. Despite the fact that these programs are considered important in reducing farmers' risk, farmers tend to adopt to crop insurance innovations (Rashidpour, 2013), while others may seem not to. Since there is still little empirical attention in the literature about the demand of these products (Enjolras *et al.*, 2012), more attention about the uptake of these products is required to fill the gap.

Furthermore, there is also evidence that, the economic performance of majority of these risk mitigating systems are beset with various challenges that impede their continuity (Castañeda-Vera *et al.*, 2014). Issues of asymmetry of information, unfair loss adjustment procedures, biases in setting premium as well as poorly designed policies are some of the factors responsible in causing disappointments in agricultural insurance industry (Gülseven *et al.*, 2011; Binswanger-Mkhize, 2012; Castañeda-Vera *et al.*, 2014). Hence, understanding the factors that affect purchase of crop insurance is important so as to evaluate how suitable insurance programs are as well as finding out how the public is supportive to the programs (Enjolras *et al.*, 2012).

In Bunda district, fifty five per cent of the total planted area is grown with cotton, making it one of the major cash crops in the district that is supporting the livelihood of majority of farmers in area (URT, 2007). However, cotton growers in the district and Tanzania in general have been constantly faced with unfavourable weather conditions, variability in prices of inputs and outputs, disease outbreaks as well as poor market structures (Rweyemamu, 2003). If there are no proper agricultural risk transferring devices, farmers who are mostly affected by the recurring crop yield loss due to bad weather will continue relying on government for relief aid, a situation that may render small holder famers languish in chronic poverty trap (Barrett *et al.*,

ISSN: 2053-2199 (Print), ISSN: 2053-2202(Online)

2008; Rue, 2009; Akyoo *et al.*, 2013).

Over a long time, there has been a positive attitude by the government of Tanzania to venture on crop insurance as an alternative way to helping farmers minimize risk and increase production. It was not until 2007 when the first crop insurance trial program was launched in two district of Manyara region (Akyoo *et al.*, 2013). In 2012, a drought insurance pilot program was launched in Tanzania too, covering the value of inputs given to cotton growers on credit in Bunda district (Maina, 2012). Despite launching of this trial program, there is hardly any empirical evidence on the development of the drought insurance program in the country. Neither has there been a full-fledged traditional or innovative crop insurance program in the country to date (Akyoo *et al.*, 2013). Hence, it was the motive of this study to understanding what influences uptake of insurance contract in the drought insurance pilot program. The objective of this paper is therefore to understand factors influencing holding of drought insurance contract by cotton growers in Bunda district, Tanzania.

AGRICULTURAL INSURANCE UPTAKE: EMPIRICAL STUDIES

Demand of agricultural insurance

Over a long time, researchers and policy makers have been concerned with agricultural risks and how to manage them using insurance (Enjolras *et al.*, 2012). Although the failures of traditional agricultural insurance markets and their unsustainability, according to Enjolras *et al.* (2012) are due to lack of public support, even when there is strong public support, the demand of insurance is usually low owing to factors of demand and supply. Some authors have tried to give the reasons behind low uptake as being caused by the conditions of supply emanating from problems of systemic risk, moral hazard, and adverse selection which hinders successful emergence of independent traditional crop insurance (Miranda, 1991; Mahul, 1999; Bourgeon & Chambers, 2003). When there is no government subsidies or re-insurance, insurance companies tend to pass this burden of cost to farmers' premiums whereby they finally fail to handle (Miranda & Glauber, 1997; Enjolras *et al.*, 2012).

On the other hand, explanations for the demand side are explained to be failure of farmers to assess the benefits that can be obtained from venturing into an agricultural insurance program as well as the farmers' low interest to agricultural insurance due to presence of alternative tools or strategies to manage their risks such as product diversification, credit and some financial markets (Garrido & Zilberman, 2008; Enjolras *et al.*, 2012). Evidence from literature further shows that farmer's demand for these new products has been surprisingly low (Giné & Yang, 2009; Rue, 2009), with the limited access to insurance products being explained as being lack of trust by farmers in insurance providers as well as lack of farmer understanding about new and complex insurance products.

ISSN: 2053-2199 (Print), ISSN: 2053-2202(Online)

Some studies about demand of agricultural insurance however, have shown promising results. Liu *et al.* (2010) for example, did a study to analysis the demand for weather index agricultural insurance on household level in Changfeng and Huaiyuan county of Anhui province in China. Their results showed that, more farmers were interested with weather index agricultural insurance. It was revealed in their study that, farmers who expressed more interest in Weather Index Agricultural Insurance are those who were more familiar with insurance, farmers whose losses were higher due to deficient or excessive rainfall and farmers who had more trust in the accuracy of local weather forecasts.

Factors affecting uptake of agricultural insurance

Enjolras *et al.* (2012) did a study to understand which factors affect crop insurance decision by farmers in France and Italy. They noticed in their findings that, agricultural indicators such as the size of the farm, measured by the cultivated area, and diversification, measured by the number of cultivated crops, were key factors for insurance purchase decision in both countries. Also in 2011, Rashidpour (2013) carried out a study in west Azarbaijan province to assess the factors that affect farmers demand for agricultural crop insurance. Results from this study showed that the most important effective factors on insurance demand in the area were classified into seven factors namely product and raw materials price fluctuations, manufacturing facilities and income, and information of insurance Others were government policies-insurance support, risk factors, market conditions as well as farmer's position in society.

A survey of famers to explain crop insurance purchases was undertaken by (Boyd *et al.*, 2011) who used Probit model for analysis. In their study they assessed the factors affecting crop insurance purchases in Inner Mongolia China and found out that the purchase of crop insurance was explained by a number of variables such as trust of crop insurance company, previous purchase of crop insurance, role of head of village number of family members working in a city etc. To understand the interest of farmers and insurance companies in farm insurance, another study by (Nimoh *et al.*, 2011) used the Probit model when they analysed the effect of factors affecting the willingness of cocoa farmers to accept farm insurance. These authors found out that other occupation of farmer, farm size and owner of land for farming were found to influence farmers' willingness to accept farm insurance policies in Sekyere West Municipal of Ghana. Findings by Nimoh et al revealed that majority of the farmers were willing to insure their cocoa farms to serve as a guarantee for their farms. Unfortunately their study found out the level of interest by insurance companies did not match up as they were afraid of loss of investment capital. They concluded from their findings that farmers' engagement in other activities other than farming as their main occupation had a significant effect on their willingness to insure their farm.

Since most countries in developing countries lack government subsidized crop insurance programmes, innovative crop insurance products provide farmers a way to mitigate production

ISSN: 2053-2199 (Print), ISSN: 2053-2202(Online)

risk without the problems of moral hazard, adverse selection and high administrative cost that often plague conventional agricultural insurance (Wang *et al.*, 2013). Subsequently, although Tanzania witnessed an introduction of the drought insurance in 2012, not much has been known from the literature about the uptake of this product in the area. Understanding factors that affect the uptake of drought insurance is necessary in evaluation of the reliability and sustainability of the insurance program (Enjolras *et al.*, 2012).

Evidence shows that, much of the performed research on crop insurance has focused on participation (Ginder & Spaulding, 2006). Although such studies provide analysis of producers who purchase insurance products, knowledge gap about factors influencing farmers' purchase of insurance contracts still exists. There have been efforts recently to investigate farmers' decisions towards crop insurance options. The investigation that this study carries is a continuation of the efforts to add on the knowledge about factors influenced holding of drought insurance contract by farmers in Bunda, Tanzania.

RESEARCH METHODOLOGY

Study area, sample size and data collection

A cross sectional survey was carried out in December, 2013 to cotton growers from three wards of Bunda district in Tanzania, involving farmers who were in the program and non-participating farmers. For this purpose, a sample size of 410 respondents were selected from a sampling frame of 3422 household heads from nine villages of the three wards using excel aided simple random sampling. After questionnaire pre-testing in a village close to the study area, information on socioeconomic characteristics as well as variables pertaining to holding of drought insurance were gathered, coded and analysed using SPSS 20 statistical software.

Analysis

The socio-economic characteristics of respondents were analysed using descriptive statistics. To analyse the factors influencing holding of drought insurance in the area, a logit model was used. In this objective, we specifically wanted to be able to predict whether Holding of drought insurance by the household head can be predicted based on age, sex, education, participation in NGOs or micro-credit programs, role in village, off-farm income, arable land size, number of children in the household, experience of loss due to drought, reliance on aid as a means to cope with drought, access to media, awareness about adaptation strategies, perception of drought incidences, contract farming background, trust of drought insurance program and information source of the household about drought insurance. Hence, the null hypothesis (H_0) was: None of the independent variables affects the probability that the dependent variable will be Holding of drought insurance contract or Not holding the insurance contract. This implies that β_i (i=1,2,…,n) are all zero and that only β_0 differs from zero. The alternative hypothesis (H_1) was: The dependent variable is more likely to be holding of drought insurance for some values of the independent variables than for others. This implies that some of β_i differ from

ISSN: 2053-2199 (Print), ISSN: 2053-2202(Online)

zero. The test statistics used in this study to test the hypothesis is χ^2. The rejection region is Right tail (values of χ^2 that are significantly larger than its d.f.). We model probability of an event to happen using logit model.

$$\text{logit}: p = \text{pr}[Y=1] = \frac{1}{1+e^{-X,B}} \text{...}(i)$$

Where: X….Parameters, B….Coefficients, Y…..(0/1)
First we estimate the parameters, and then we find the probabilities. The binary Logistic regression model was adopted in assessing the factors affecting holding of drought insurance had the following specification as follows:

$$\log_e\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1\chi_1 + \beta_2\chi_2 + \text{........} + \beta_k\chi_k \text{ ....}(ii)$$

Where:
Log_e= the natural logarithm , e=2.71828…, p= the probability that the event Y occurs, p(Y=1), y = Holding of drought insurance, p/(1-p) is the "odds ratio", Log_e[p/(1-p)]= the log odds ratio, or "logit", β_0, β_1…. β_k = parameters to be estimated by the model, and $X_{1....}$ X_k=number of predictor variables. Probabilities were calculated by exponentiating equation (ii) as shown equation (iii) and thereafter, equating for P.

$$\frac{p}{1-p} = e^{\beta_0+\beta_1\chi_1+\beta_2\chi_2+\text{.........}+\beta_k\chi_k} \text{..}(iii)$$

Where:
P is the probability for holding drought insurance
$e^{\beta_0+\beta_1\chi_1+\beta_2\chi_2+\text{.........}+\beta_k\chi_k}$ is the odds ratio

Before analysing the set of variables using logistic regression, a linear regression was used to calculate the variance inflation factor (VIF) so as to screen for Multicollinearity of predictor variables in in the binary logistic model $Y= B_0 + B_1X_1 + B_2X_2 + ... + B_{16}X_{16}$. Since independent categorical variables in this case do not possess interval scales, Pearson Correlation was used to check for predictors with high correlation. Variables with high correlation would affect the logistic regression results hence they were omitted. Only those that had medium correlation were retained so as to be included in the final logistic regression analysis. Checking for multicolleniarity involved calculation for Variance Inflation Factor (VIF) and Pearson's correlation. Seven predictors namely sex (X_2), Households with children (X_8), Access to media(X_{11}), had correlations above 0.4, and were excluded from the model. After omission of the eight predictors, the remaining independent variables were included in the model allowing for analysis to be re-run. The statistical software SPSS 20 was used for the entire analysis.

ISSN: 2053-2199 (Print), ISSN: 2053-2202(Online)

RESULTS AND DISCUSSION

Socio-economic characteristics of respondents

Results showed that majority of households in the surveyed area (83%) were headed by males and 27% by females. This percentage was higher than the Mara region's male headed household percentage of 78, according to National Sample Census of Agriculture (NSCA) 2007/2008 (URT, 2012). In Tanzania, people are considered economically productive if their ages range from 15-64 years and are non-productive outside that range (Mattee *et al.*, 1998). Results showed that, 92.7% of respondents were of productive age while 7.3% of household heads had ages above 64 hence falling into the non-productive age category (table 1). Results for the education status of heads of households showed that 80.5% of respondents in the area attended formal education whereas, 19.5 % never attended school. There were more household heads who never attended formal education for the non-participating farmers than for those participating in the program, as results revealed that 21.2% of them never attended school while the participating farmers who never had formal education were 18.5%. With regards to education attained at various levels ranging from primary school to post-primary education, results indicated that a large number of household heads had primary education (76.1%) and only 4.4% had post primary education. However, about 6% of non-participating households had post primary education while the participating farmers with post primary education were as low as 3.5%.

Table 1: Sex and age groups of respondents

Farmers	Sex of respondents		Age group (yrs) by productivity		
	Females	***males***	***15-64***	***65 and up***	***Total***
Non Participants	16.6	83.4	93.4	6.6	100
Participants	17.4	82.6	92.3	7.7	100
Total	17.1	82.9	92.7	7.3	100
	Nonformal	***Primary***	***Secondary***	***Post sec***	
Non participants	21.2	72.9	3.9	2	100
Participants	18.5	78	3.5	0	100
Overall	19.5	76.1	3.7	0.7	100

Findings further indicated that the average family size in the area of study was 7.0, which was higher than the Bunda district's average of 6.7 according to Tanzania's 2007/2008 National Sample Census of Agriculture. Results showed that majority of households surveyed (72%) had cotton farms of sizes between 1 to 3 acres which is less than two hectares and few (27%) grew cotton on farms of nearly 2 or more hectares of land. The average cotton farm size in the area was 2.85 acres (1.15ha.).

ISSN: 2053-2199 (Print), ISSN: 2053-2202(Online)

Table 2: Percentage distribution of Households' family size and cotton land sizes

Family and cotton farm sizes of households			
	Non participants	*Participants*	*Total(n=410)*
Family size			
1-4	15.2	12.4	13.4
5-7	43.7	44.4	44.3
Above 7	41.1	43.2	42.3
Total	100.0	100.0	100.0
Farm size			
1-3	74.8	70.7	72.4
4-6	25.2	25.5	25.2
7 and above	0.0	3.9	2.4
Total	100.0	100.0	100.0

With regards to sources of livelihood, about ninety seven per cent of households' main sources were from farming activities they undertake yearly. Findings showed that, 3.2 per cent of respondents had their livelihood sources mainly from employment, engaging in business, and some depended on remittance

Factors Affecting Holding of Drought Insurance

The model's robustness in prediction (Null model)

The first output, block zero, showed there were 410 households in the sample with the dependent variables being holding of drought insurance. The null model in the binary regression model showed the intercept with no predictors included in the model. We can see that 259 household heads held the drought insurance and 151 didn't hold (table 3). The classification accuracy at this stage was 63.2%.

Table 3: Classification table of the null model

Classification Table[a,b]					
			Predicted Holding of drought insurance		
Observed			Do not hold	Hold	Percentage Correct
Step 0	Holding of drought insurance	Do not hold	0	151	0.0
		Hold drought	0	259	100.0
	Overall Per centage				63.2

a. Constant is included in the model.

b. The cut value is .500

ISSN: 2053-2199 (Print), ISSN: 2053-2202(Online)

Table 4 shows the variables that were not in the equation in the null model. Out of eight, five variables namely households that suffered from loss, Trust of insurers by households, information source of the household, household's perception of drought insurance and households with children between 0-2 were significant. The overall statistics in the nine variables was statistically significant, suggesting that the model would be predictive if these variables were included in the model.

Table4: Variables not in the equation

Variables not in the Equation					
			Score	df	Sig.
Step 0	Variables	Perception(1)	203.235	1	.000***
		Sufloss(1)	31.898	1	.000***
		Aiddep(1)	.019	1	.889
		Trustins(1)	3.325	1	.068*
		Agegroup	.302	3	.960
		Agegroup(1)	.138	1	.710
		Agegroup(2)	.239	1	.625
		Agegroup(3)	.001	1	.979
		Infotype(1)	2.764	1	.096*
		Landsizegrp	.874	2	.646
		Landsizegrp(1)	.830	1	.362
		Landsizegrp(2)	.784	1	.376
		Childgrp	3.579	2	.167
		Childgrp (1)	3.501	1	.061*
		Childgrp (2)	.810	1	.368
	Overall Statistics		210.473	12	.000***

The omnibus test of model coefficient in table 5 tested the full model's predictive capacity. It tested the null hypothesis that there is no predictive capacity in the logistic regression analysis. We rejected the null hypothesis because the chi-square statistics in the omnibus test was significant; hence the model had some predictive capacity.

Table5: The omnibus tests of model coefficient

Omnibus Tests of Model Coefficients				
		Chi-square	df	Sig.
Step 1	Step	235.396	12	.000
	Block	235.396	12	.000
	Model	235.396	12	.000

Results from the Nagelkerke R Square in table 6 of the model summary showed that about 60% of variability in the dependent variable was accounted for by variance in the independent variables. The Hosmer-Lemeshow test (table 6) was used to test the model's goodness of fit

ISSN: 2053-2199 (Print), ISSN: 2053-2202(Online)

and results suggested that the model did fit (p-value 0.998).

Table 6: The model summary and Hosmer & Lemeshow Test

Model Summary				Hosmer and Lemeshow Test		
Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square	Chi-square	df	Sig.
1	304.197[a]	0.437	0.597	0.965	8	0.998

a. Estimation terminated at iteration number 6 because parameter estimates changed by less than .001.

Classification table (Full model)

Results from classification table of the full model further indicated that the model was worthwhile as 86.3% of cases (households) were correctly classified (table 6). Comparing it to the null model (table 3), we can see that adding the predictors in the full model increased the likelihood of a correct prediction of holding the drought insurance by 23.1% (table 6), suggesting that it was a particularly accurate model. In the full model, it can be seen that prediction of holding of drought insurance was more accurate (96.5%) than prediction of not holding drought insurance (68.9%). However, despite this difference, the model was able to accurately predict both cases in more than 50% accuracy. This justified the robustness on the model in predicting.

Table 6: Classification table

Classification Table[a]					
			Predicted Holding drought insurance		
Observed			Do not	Hold	Percentage Correct
Step 1	Holding drought insurance	Do not hold	104	47	68.9
		Hold	9	250	96.5
	Overall Percentage				86.3

a. The cut value is .500

Variables in the equation

The eight independent variables that were included in the analysis are shown in table 7 with a sig. column indicating their respective significance in prediction. Results showed that perception (p = .000), Households that suffered loss (p = .006) and Households heads with age between 46 to 60 years (p = .069) added significantly to the model, while all of the remaining independent variables did not.

ISSN: 2053-2199 (Print), ISSN: 2053-2202(Online)

Table 7: Variables in the equation

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	Perception(1)	-4.530	.481	88.609	1	.000***	.011	.004	.028
	Sufloss(1)	-1.804	.650	7.705	1	.006***	.165	.046	.589
	Aiddep(1)	.328	.424	.598	1	.439	1.388	.605	3.186
	Trustins(1)	.000	.306	.000	1	.999	1.000	.549	1.822
	Agegroup			3.698	3	.296			
	Agegroup(1)	-.656	.608	1.165	1	.280	.519	.158	1.708
	Agegroup(2)	-.837	.613	1.865	1	.172	.433	.130	1.439
	Agegroup(3)	-1.095	.603	3.295	1	.069*	.334	.103	1.091
	Infotype(1)	-.544	.525	1.075	1	.300	.581	.208	1.623
	Landsizegrp			.478	2	.787			
	Landsizegrp(1)	-.329	.610	.290	1	.590	.720	.218	2.380
	Landsizegrp(2)	-.149	.607	.060	1	.806	.861	.262	2.833
	Children			2.270	2	.321			
	Children(1)	-.680	.453	2.252	1	.133	.507	.209	1.231
	Children(2)	-.451	.408	1.224	1	.269	.637	.286	1.416
	Constant	3.151	.849	13.773	1	.000	23.355		

a. Variable(s) entered on step 1: Perception, Sufloss, Aiddep, Trustins, Agegroup, Infotype, Landsizegrp, Children.

Hence, the model fit was as shown in equation (iv).

$$\log_e\left(\frac{p}{1-p}\right)=3.151-4.53Percp-1.804Sufloss-1.094Age(3)......(iv)$$

Where:

Percp = Household heads with perception about drought incidence occurrences
Sufloss= Households that suffered loss due to drought
Age(3) = Household heads with age between 46-60

Based on the variables that added significantly to the prediction (table 7), the probability of holding drought insurance the model predicted for the cotton growers was calculated. As explained by the model equation (iv), results showed that when all other independent variables are held constant, a unit increase in perception of household head decreased the log odds of household to hold drought insurance by 4.53, on average. In other words, a unit increase in perception about drought incidences by the household resulted in the decrease of the probability of holding drought insurance by 0.01 (1%) given that other predictors are held constant (equation iii). The next variable predicted by the model was the households that suffered loss.

ISSN: 2053-2199 (Print), ISSN: 2053-2202(Online)

Findings revealed that a unit increase in household that suffered loss due to drought decreased the log odds of holding drought insurance by 1.804 on average *ceteris paribus*. Translating it into probability, a unit increase in households that suffered loss resulted in the decrease of the likelihood of holding drought insurance by 0.14 (14%) when other predictors are kept constant. Results for the last model's prediction indicated that, when all other independent variables were held constant, a unit increase in household heads with age between 46-60 decreased the log odds of holding drought insurance by 1.094, on average. Explaining it by probability, a unit increase in household heads whose ages ranged between 46-60 resulted in decrease of the probability of holding drought insurance by 0.25 (25%) given that other predictors are held constant.

DISCUSSION

Findings showed that the most important factors that affected uptake of drought insurance in the study area were perception of respondents about the drought incidence occurrences, household that previously suffered loss due to drought and the productive age with more experience in farming. However, these independent variables affected the uptake of drought insurance contracts negatively. These results imply that, even when respondents perceived and admitted to have been affected with recurring drought incidences in the area, they were less likely to hold the drought insurance contracts of the insurance program under pilot. This little appetite to hold the drought insurance contracts was also seen from famers of 46 to 60 years of age that were actively engaged in production, and as their age group suggests, they were more experienced in farming.

Trust of contract providers, previous holding of contracts on contract farming and farm size in this study were all not significant hence they did not have any influence as factors influencing holding of drought insurance contracts in the area. These results are in contrast with both the findings by Boyd *et al.* (2011) and Nimoh *et al.* (2011). In their study to assess the factors that affect crop insurance purchases in Inner Mongolia, Boyd *et al.* found out that the purchase of crop insurance was explained by variables such as trust of crop insurance company, previous purchase of crop insurance and role of household head in the village where on their side Nimoh *et al.* found out that farm size was among the factors that influenced willingness to accept insurance policies in Sekyere West Municipal of Ghana.

These findings could have an implication of mismatch of information when the program was being introduced that went along with promises of good results from the program that were not clearly or exclusively comprehended and communicated to farmers. There is also a possibility that famers might have had uncomfortable experience from similar programs implemented previously.

ISSN: 2053-2199 (Print), ISSN: 2053-2202(Online)

CONCLUSION AND RECOMMENDATIONS

The most important factors that influenced holding of drought insurance in the study area were perception of respondents about the drought incidence occurrences, household that previously suffered loss due to drought and the productive age with more experience in farming. However, these factors negatively influenced the uptake of drought insurance contracts in the area. Farmers are primary producers who should not be played down in the risk management arrangements. Concerted efforts to developing convenient risk managing tools in Tanzania should be central in assisting them manage their risks. The government and partners should strive at finding proper ways to improving the terms and conditions of the insurance contracts so as to enable farmers realize the benefits of the scheme. Although the implementation of the drought insurance is still at its pilot stages, it is essential to consider and adequately incorporate farmers 'needs into the technicalities of program implementation in Tanzania that would see improvements of uptake of drought insurance in the country once the program advances into its full-fledged scheme.

REFERENCE

Akyoo, A., Temu, A., & Hella, J. (2013). Agricultural production risks, coping mechanisms and potential for crop insurance in Tanzania. *Time Journals of Agriculture and Veterinary Sciences, 1*(1), 11-22

Ankolekar, M., & Janz, K. (2012). *Supply and Demand Side Study incl. Product Development and Subsidies*. New Delhi, India: The Micro Insurance Academy.

Barrett, C., Barnett, B. J., Carter, M., Chantarat, S., Hansen, J., Mude, A., . . . Ward, M. N. (2008). Poverty traps and climate risk: limitations and opportunities of index-based risk financing.

Binswanger-Mkhize, H. P. (2012). Is there too much hype about index-based agricultural insurance? *Journal of Development Studies, 48*(2), 187-200.

Bourgeon, J.-M., & Chambers, R. G. (2003). Optimal area-yield crop insurance reconsidered. *American Journal of Agricultural Economics, 85*(3), 590-604.

Boyd, M., Pai, J., Qiao, Z., & Ke, W. (2011). Crop insurance principles and risk implications for China. *Human and Ecological Risk Assessment, 17*(3), 554-565.

Castañeda-Vera, A., Barrios, L., Garrido, A., & Mínguez, I. (2014). Assessment of insurance coverage and claims in rainfall related risks in processing tomato in Western Spain. *European Journal of Agronomy, 59*, 39-48.

Enjolras, G., Capitanio, F., & Adinolfi, F. (2012). The demand for crop insurance. Combined approaches for France and Italy. *Agricultural Economics Review, 13*(1), 5-15.

Garrido, A., & Zilberman, D. (2008). Revisiting the demand for agricultural insurance: the case of Spain. *Agricultural Finance Review, 68*(1), 43-66.

Ginder, M. G., & Spaulding, A. D. (2006). *Factors affecting crop insurance purchase decisions in northern Illinois.* Illinois State University.

ISSN: 2053-2199 (Print), ISSN: 2053-2202(Online)

Giné, X., & Yang, D. (2009). Insurance, credit, and technology adoption: Field experimental evidencefrom Malawi. *Journal of Development Economics, 89*(1), 1-11.

Gülseven, O., Küçükşenel, S., & Nas, S. (2011). Trends In Agricultural Insurance: Past, Present And Future. *Actual Problems of Economics/Aktual'ni Problemi Ekonomìki, 120*(6).

IFAD. (2014). *Investing in Rural People in the United Republic of Tanzania*. Rome, Italy: International Fund for Agricultural Development. Retrieved on Nov. 8th 2014 from http://www.ifad.org/operations/projects/regions/pf/factsheets/tanzania.pdf.

Liu, B., Li, M., Guo, Y., & Shan, K. (2010). Analysis of the demand for weather index agricultural insurance on household level in Anhui, China. *Agriculture and Agricultural Science Procedia, 1*, 179-186.

Mahul, O. (1999). Optimum area yield crop insurance. *American Journal of Agricultural Economics, 81*(1), 75-82.

Maina, P. (2012, April 2012). MicroEnsure's Weather Index Insurance Product Pilot in Tanzania. *IFC Advisory Services/Access to Finance, 1, April 2012,* Retrieved on 2nd Nov. 2014 from http://www.ifc.org/wps/wcm/connect/2413b41804f41361a46788f41807ce032730e032794e/GIIF-Newsletter_Issue032731-April%032732B032012.pdf?MOD=AJPERES.

Mattee, A. Z., Lassale, T., & Temu, A. E. (1998). Farmers' Groups as a Strategy for Tanzania. In: *The third Faculty of agriculture Annual Scientific Research Conference on Promotion of Agriculture Production in Tanzania.* (Edited by Kinabo, J.L, Temu, A.E, Kifaro, G.C. and Mbaga,S.D). 6-8 May 1998

Miranda, M. J. (1991). Area-yield crop insurance reconsidered. *American Journal of Agricultural Economics, 73*(2), 233-242.

Miranda, M. J., & Glauber, J. W. (1997). Systemic risk, reinsurance, and the failure of crop insurance markets. *American Journal of Agricultural Economics, 79*(1), 206-215.

Munishi, P., Shirima, D., Jackson, H., & Kilungu, H. (2010). *Analysis of climate change and its impacts on productive sectors, particularly agriculture in tanzania.* Paper presented at the Workshop on Prospects for Agricultural Growth in a Changing World, Government of Tanzania and World Bank, Dar es Salaam, Tanzania.

Nimoh, F., Baah, K., & Tham-Agyekum, E. K. (2011). Investigating the Interest of Farmers and Insurance Companies in Farm Insurance: The Case of Cocoa Farmers in Sekyere West Municipal of Ghana. *Journal of Agricultural Science, 3*(4), p126.

Rashidpour, L. (2013). Factors Affecting on Demand for Agricultural Crop Insurance in West Azarbijan Province. *American-Eurasian Journal of Agric. & Environ. Sci, 13*(2), 244-249.

Rue, C. J. (2009). *Area-yield crop insurance reconsidered (again): An empirical analysis of demand for area yield insurance for rice farmers in Peru*: University of California, Davis.

Rweyemamu, D. (2003). Reforms in the agricultural sector: the Tanzanian experience. *Economic and Social Research Foundation, Dar Es Salaam*.

Seyed, A. S., Farahnaz, R. G., Seyed, A. S., Yaser, M., Omid, S., & Abass, A. (2010). Survey of effective factors on adoption of crop insurance among farmers: A case study of

ISSN: 2053-2199 (Print), ISSN: 2053-2202(Online)

Behbahan County. *African Journal of Agricultural Research*, *5*(16), 2237-2242.

Shiferaw, B., Tesfaye, K., Kassie, M., Abate, T., Prasanna, B., & Menkir, A. (2014). Managing vulnerability to drought and enhancing livelihood resilience in sub-Saharan Africa: Technological, institutional and policy options. *Weather and Climate Extremes*.

URT. (2007). *National Sample Census of Agriculture 2002/2003 Volume Vt: Regional Report: Mara Region*

Dar Es Salaam: National Bureau of Statistics. Retrieved on 16th Nov. 2014 from www.nbs.go.tz/takwimu/Agriculture/MARA%20REGION%20REPORT.pdf.

URT. (2012). *National Sample Census of Agriculture 2007/2008 Regional Report -Mara Region (Volume Vt)*. Dar Es Salaam: Ministry of Agriculture, Food Security and Cooperatives. Retrieved on 14th Nov. 2014 From http://harvestchoice.org/sites/default/files/downloads/publications/Tanzania_2007-8_Vol_5t.pdf.

Wang, H. H., Karuaihe, R. N., Young, D. L., & Zhang, Y. (2013). Farmers' demand for weather-based crop insurance contracts: the case of maize in south africa. *Agrekon*, *52*(1), 87-110.

ISSN: 2053-2199 (Print), ISSN: 2053-2202(Online)