International Scholars Journals

International Journal of Agricultural Sciences ISSN 2167-0447 Vol. 8 (6), pp. 1457-1464, June, 2018. Available online at www.internationalscholarsjournals.org © International Scholars Journals

Full Length Research Paper

A study of factors that influence livestock insurance adoption by livestock farmers in Namibia

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Accepted July 12, 2017

A sample survey of 269 questionnaires was administered to commercial and communal cattle farmers in the two regions of Namibia, (Omaheke and Otjozondjupa) to identify factors which affect the adoption of livestock insurance. About 205 questionnaires were collected and the 64 questionnaires were regarded as irregular responses or not returned. A computer software programme was used to generate a logit model. This model was used to test the alternative risk management strategies used by farmers in the two regions. In addition, this research took into account the off-farm investment and farm enterprise diversification. The logit model produced results that are statistically significant and negative estimated coefficient of the household characteristics. This implies that the Namibian livestock industry growth can be achieved with improved education, experience and support from other income as way of diversifying risk strategy. However, the positive relationship of variables FTHEFT and PROD implies the sector is suffering from continuous risk of theft and requires quality production to get market access. This necessitates the need for policy makers and insurers to design programme to educate farmers so that they can adopt proper risk management tools and thereby increase their participation in insurance. The low level of education of many farmers in the study area may have negatively influenced the decision to purchase livestock insurance in addition to other factors.

Key words: Risk management strategies, logit model, Namibia livestock industry.

INTRODUCTION

Natural disasters such as floods and bushfires can have a major impact on the management and financial viability of rural properties, as well as major implications for animal welfare. Landholders have a responsibility to ensure that management and property development plans recognise the risks and incorporate the strategies that are necessary to ensure the safety of all persons, livestock and any residential dwellings, and the security of the plants and equipments in the event of such a disaster. The cyclical nature of production is a characteristic of livestock farming which is caused primarily by the climatic conditions such as flooding and drought. Moreover, human-made disaster such as theft and starting of fires are other risks for losing livestock. To avoid such kind of loss of livestock productivity, it is important to increase insurance awareness campaigns among the farmers. Insurance awareness enable farmers to realise the need for livestock insurance, therefore insure their livestock, which can then be considered as a way of risk management and management skills. Risk assessment and risk reduction strategies need to be considered by Namibian livestock farmers regardless of the size of the property. These are the basic elements that assist in developing an awareness of the range of risks and issues (Bowler, 2007). In Namibia, cattle farming are the main agricultural production sector with annual estimated value of N$900 million, and of which about N$400 million is being contributed by exports of weaner. The total number of cattle in 2006 was estimated to be 2.3 million (Meat Board of Namibia, 2007). In this context, the objective of this study is to assess the appropriateness of insurance as a risk management tool for farmers in communal and commercial areas. The research includes a literature study of the principles,

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opportunities and problems of risk- sharing strategies in Namibia. Secondly, an empirical study of farmers' perceptions of risk and risk management were carried out by administering questionnaires among a large sample of livestock farmers. Since livestock production is the backbone of the economy of Namibia, it is vital for farmers to gain awareness about the importance of insurance. Therefore, this study makes a contribution for improvement of the know-how of farmers regarding risk assessment in their farming activities. Therefore, the main objectives of this paper are to examine factors that influence livestock insurance adoption by livestock farmers in Namibia's Omaheke and Otjozondjupa regions and draw some policy implications from the results.

METHODOLOGY AND DATA

General

A structured questionnaire was used to identify factors that affect the use of insurance. Semi-structured interviews were conducted with farmers at their respective farms. Information on livestock production characteristics in the smallholder farming systems was obtained from communal and commercial farms in Omaheke and Otjozondjupa. The Omaheke and Otjozondjupa regions are the two major producers of livestock in Namibia. Hanagara (2009) on his study shows that communal and commercial farmer in Omaheke registered with Meat board of Namibia estimated to be 5727 and 390 respectively. Whereas number of farmers at Otjozondjupa were unable to registered, when an inquiry made to the farmer from that area estimation from his knowledge indicated it should be less than Omaheke. A total of 269 questionnaires were distributed to the farmers in these regions. From this 42 of questionnaires were collected from commercial farmers and about 163 were collected from communal farmers. The remaining 64 questionnaires were regarded as irregular response or not returned. With the assumption of Otjozondjupa the same population as Omakeke, the surveyed questionnaire is fairly representative; this accounts for 5 and 1% communal and commercial farmers respectively.

Household characteristics

The following household characteristics were included: sex; age; level of training/education attained; farming experience; and size of the household.

Study area

The study was conducted in Omaheke and Otjozondjupa regions and focussed on both communal and commercial farming systems using 205 respondents, which is fairly representative of the study area. The respondents were chosen for particular purposes on the basis that they were involved in livestock farming in these two regions, and on basis that they were "typical" of a group or represented diverse perspectives of livestock farming (Leedy and Armrod, 2000). District interviews were conducted using students residing in these regions. This proved to be cost effective way of colleting data. The estimated population of farmers was supplied by Agricultural Extension Officers or village heads as the sampling frames.

Review of current literature

Jarvie and Nieuwoudt (1988) define insurance as "… the elimination of the uncertain risk of loss for the individual through the combination of a large number of similarly exposed individuals who each contribute …premium payments sufficient to make good the loss caused to any one individual." Thus, the idea behind insurance is that of risk pooling, which involves combining the risks faced by a large number of individuals who contribute through premium payments to a common fund that is used to cover the losses incurred by any individual in the pool (Hardaker et al., 1997). Insurance, in general, can provide protection against adverse economic losses experienced by individuals and firms, and caused by natural phenomena such as fire, hail and floods. The decision to buy insurance against risk in agriculture should be an economic one. In making that decision, requires the consideration of the following two critical factors:

1) How much loss can the manager (farmer) withstand without insurance?
2) What are the trade-offs between insurance costs and potential losses (Casavant and Infanger, 1984)?

Therefore, insurance is more attractive to risk-averse farmers and in situations where risks warrant paying a premium significantly higher than the expected loss without insurance (Hardaker et al., 1997). However, in some countries government subsidises premiums, making the purchase of insurance more attractive (Eidman, 1990). There are two basic issues that affect both the insurer and insured. These are asymmetric information and systemic risk. Asymmetric information relates to the problem that the insurer and the insured may not have the same information regarding the probability of losses occurring. The problem could arise due to either adverse selection or moral hazard. Adverse selection occurs if those more at risk purchase more insurance than others, without the insurer being aware. "As a result, the insurer's expected indemnity outlays exceed total premium income, and, in the long run, the insurance operation loses money" (Nieuwoudt, 2000).

RESULTS AND DISCUSSION

Descriptive result analyses

Table 1 shows the diversification of risk, non- farm income and insurance awareness. The research revealed that 95.2% commercial and 98.2% communal farmers in Omaheke and Otjozondjupa regions have no insurance cover for their livestock. They use non- farm income and diversify their farm activities as means of risk management strategy. Furthermore, the study reveals that 71.4% of commercial farmers and 92% of the communal farmers have off farm income to support their farming. From the survey conducted, the study finding implies that farmers in Namibia might not insure their livestock. 26.2% of the commercial farmers revealed that they cannot afford to pay insurance premium, and 27% revealed that they do not see the importance of insuring livestock. For similar research question, results from communal farmers show 17.2 and 82.8%, respectively (Table 2). This indicates that the livestock farmers' awareness to insure is very poor in Omaheke and Otjozondjupa regions of Namibia.

Table 1. Percentage of response to different questions.

	Commercial farmers			Communal farmers		
Description	**Yes**	**No**	**No response**	**Yes**	**No**	**No response**
Do you have other non- farm income?	71.4	23.8	4.8	92	6.7	1.2
Do you think insurance is important?	57.1	42.9		93.2	6.8	
Do you have insurance?		95.2	4.8		98.2	1.8
Do you diversify your risk?	33.3	54.8	11.9			

Table 2. Summary statistics of reasons for not insuring livestock.

		Commercial farmers			Communal farmers		
		Frequency	**Percent**	**Valid percent**	**Frequency**	**Percent**	**Valid percent**
Valid	I could not afford	11	26.2	28.9	28	17.2	17.2
	I do not see the importance	27	64.3	71.1	135	82.8	82.8
	Total	38	90.5	100.0	163	100.0	100.0
Missing	System	4	9.5				
Total		42	100.0				

Table 3. Summary description of the study areas and sample sizes used for the diagnostic study.

		Commercial farmers			Communal farmers		
		Frequency	**Percent**	**Valid percent**	**Frequency**	**Percent**	**Valid percent**
Valid	Male	39	92.9	92.9	127	77.9	77.9
	Female	3	7.1	7.1	36	22.1	22.1
	Total	42	100.0	100.0	163	100.0	100.0

Table 4. Summary description of type of farming.

		Commercial farmers			Communal farmers		
		Frequency	**Percent**	**Valid percent**	**Frequency**	**Percent**	**Valid percent**
Valid	Livestock	29	69.1	76.2	82	50.3	50.3
	Mixed farming	13	30.9	23.8	81	49.7	49.7
	Total	42	100.0	100.0	163	100.0	100.0

Table 3 summarises the gender distribution data in the survey, in both farming sectors, the largest portion of the respondents were male and this shows that there is gender imbalance in this sector. This could imply that government and other non- governmental stakeholders in gender equality need to encourage female farmers' participation.

Table 4 shows that commercial farmers who practise livestock farming, account for about 69% of the respondents. This shows that commercial farmers focus mainly on increasing productivity by specialising on the specific enterprise. On the other hand, communal farmers responded that they are engaged in both livestock and mixed enterprise on equal basis (50:50%). This implies that the communal farmers try to diversify their farming activities. This could be due to poor resource ownership preferred to diversify risk and getting advantages of multiple income generation.

The responses on diversifying enterprise indicates that about 16.7% commercial farmers regard profit as the main motive for farming, 9.5% of farmers indicated that they diversify in order to avoid risk and 4.8% indicated that they diversify to create jobs for their families. On the other hand, communal farmers reveal that about 14% diversify with the expectation of creating jobs, 12.3% to avoid risk and 11.7% for profit reasons (Table 5).

Tables 6 and 7 illustrate the perception of insurance by communal and commercial farmers. The research found that the livestock farmers' perception to insurance is good

Table 5. Summary of reasons for diversifying farming enterprises.

		Commercial farmers			Communal farmers		
		Frequency	**Percent**	**Valid Percent**	**Frequency**	**Percent**	**Valid Percent**
Valid	To get better profit	7	16.7	53.8	19	11.7	23.5
	To avoid risk	4	9.5	30.8	20	12.3	24.7
	To create a job	2	4.8	15.4	23	14.1	28.4
	Total	13	31.0	100.0	19	11.7	23.5
Missing	System	29	69.0		81	49.7	100.0
Total		42	100.0		82	50.3	
					163	100.0	

Table 6. Summary result of importance of livestock insurance.

		Commercial farmers		Communal farmers	
		Frequency	**Percent**	**Frequency**	**Percent**
Valid	Yes	24	57.1	150	92.0
	No	18	42.9	11	6.7
	Total	42	100.0	161	98.8
Missing	System			2	1.2
Total				163	100.0

Table 7. Summary result of degree livestock insurance importance.

		Commercial farmers		Communal farmers	
		Frequency	**Percent**	**Frequency**	**Percent**
Valid	Very important	16	38.1	139	85.3
	Important	7	16.7	11	6.7
	Not important	1	2.4	3	1.8
	Total	24	57.1	153	93.9
Missing	System	18	42.9	10	6.1
Total		42	100.0	163	100.0

good. These accounts for 92 and 57% of communal and commercial farmers, respectively (Table 6). When the respondents were asked how important insurance is to their livestock, 85% of communal farmers and 38% commercial farmers said it was very important (Table 6). This implies that the insurance companies in Namibia did not give much weight to advocate livestock insurance; this might be due to the nature of the farms or complicity of the enterprise to handle the sector in the insurance system.

Model

In explaining a model the dependent variable (Y_i), (where one represents the farm enterprise diversified as risk minimisation and zero represents not diversified), different regression methods can be used. Some of the methods would make use of discriminant analysis, linear probability model, logit and probit. In this study the following independent variables were considered:

Gender of the head of household; age of the head of household; year of farming experience; education level; family size; off farm income; awareness to insurance; frequency of theft; safety; productivity; frequency of sales; value of sale; credit, character of a person to risk (captured by asking his/her prescription in starting new technique).

This study follows the general modelling of Mohammed and Ortmann (2005) to test the relationship between dependent and exploratory variables. The model is as follows:

$$\ln(pi/(1-pi) = o + {}_1\text{Gender} + {}_2\text{Age} + {}_3\text{EXPLVi} + {}_4\text{EDUi} + {}_5\text{FSIZE} + {}_6\text{OFFi} + {}_7\text{INFOi} + {}_8\text{FTHIEFT} + {}_9\text{SAFETY} + {}_{10}\text{PROD} + {}_{11}\text{FSale} + {}_{12}\text{Vsales} + {}_{13}\text{CREDIT} + {}_{14}\text{Ntech} + {}_{15}\text{Dummy}$$

Where:

Table 8. Variables that influence the adoption of risk management and expected sign.

Variables	Description	Expected sign
Gender	Gender of the household,	+/-
Age	Age of the household	+/-
EXPLV	Year of farming experience	+/-
EDU	Education level head of the household	+/-
FSIZE	Number of people in the house	+/-
OINCOME	Off farm income outside the farm	-
INFO	Awareness to insurance	+
FTHIEFT	Frequency of theft	+
SAFETY	A need to increase safety of production	-
PROD	A need to increase productivity	-
FSALE	Frequency of sales	-
Vsales	Value of sales last season	-
CREDIT	Amount of loan outstanding	-
Ntech	Character of a person to risk	-
Dummy	Dummy variable for type of farming, 1 for commercial farmer, otherwise zero	+/-

(pi/1-pi) is the probability of insurance awareness, gender of the household, age of the household, EXPi is the farming experience, EDU is the educational level, Fsize is the number of family members in the house, OFFi is the off farm income, INFOi is the awareness of insurance, Ftheft is the frequency of theft, SAFETY is a need for safe production, PROD is a need to increase productivity, Fsale is frequency of sales, Vsale is a value of sales last season, CREDIT is the amount of an outstanding loan.

Consideration of the model variables

As indicated earlier, livestock insurance adoption in Omaheke and Otjozondjupa regions of Namibia is not well established. This may be due to a number of factors, such as lack of information on the livestock insurance, lack of awareness of the insurance scheme, low level of educational attainment among farmers, poor rural infrastructure (making communication difficult and limiting access to insurance), affordability, degree of farmers' risk aversion and diversification of farm enterprise. These could be among the factors that affect the insurance of livestock. The definitions of the most important variables expected to influence the adoption of livestock insurance are presented in Table 8.

The expected sign for risk management between male and female farmers could be positive or negative; male farmers are most likely to be risk takers and expected to invest in one enterprise for higher return. On the other hand, since men have relative higher power and time to spend at the farm, they could do mixed farming to keep themselves busy at the farm. Age and experience holds similar impact to the adoption of risk management.

The expected sign for educational qualification could be positive or negative. Education may promote an understanding of the effects of risk and hence may increase the demand for diversification of the enterprise as risk management. On the other hand, increasing education levels are associated with an increase in transferable human capital, facilitating greater risk taking by individuals with lower risk aversion (Szipiro and Outreville, 2003 cited in Mohammed and Ortmann, 2005). Family size was expected to have a positive effect as the numbers of family members were dependent on the farm. As farmers participate in off-farm investments this will be take as a risk management strategy, the probability of diversifying enterprises decrease, either due to other secured income or they do not have time to involve in additional farm enterprises. Therefore, the expected sign for off-farm income will be negative. As farmers' attitude towards insurance increases, it is most likely that farmers will see need to subscribe to insurance. Further, as the frequency of theft increases, it is necessary for farmers to diversify farming to avoid potential losses.

Although diversification is an alternative risk management strategy, it does not necessarily mean that diversification and insurance always can closely substitute each other (Blank and McDonald, 1996).

LOGIT MODEL RESULTS

A chi-square test was used to test the equality of the standard deviation of a population to a specified value. This test can be either a two-sided test or a one-sided test, the two- sided version tests against the alternative that the true standard deviation is either less than or greater than the specified value. The one-sided version only tests in one direction. The choice of a two-sided or one-sided test is determined by the problem (Snedecor

Table 9. Logit model results for livestock risk management adoption in Namibia (n = 200).

Variables	Coefficient estimate	Standard error	Wald	t-stat	Significance
Gender	7.667	3.808	4.073	0.162**	0.0436
Age	-0.0654	0.0291	5.074	-0.197**	0.0243
EXPLV	-0.0212	0.0536	0.157	0.692***	0.0001
EDU	-1.003	0.598	2.809	-0.101*	0.093
FSIZE	0.594	0.268	4.931	0.192**	0.0264
OINCOME	3.77	1.511	6.22	0.231**	0.0126
INFO	0.883	1.58	0.312	0.001*	0.5763
FTHIEFT	1.338	0.838	2.553	0.083*	0.1001
SAFETY	0.0314	0.893	0.0012	0.0001	0.971
PROD	4.015	1.929	4.33	0.172**	0.0374
FSALE	-3.792	1.485	6.519	-0.239*	0.0107
Vsales	0.0005	0.0003	3.469	0.1358*	0.0629
CREDIT	-4.256	1.74	5.989	-0.224***	0.0629
Ntech	-1.725	1.409	1.498	-0.001	0.2209
Dummy	-12.833	6.72	3.65	-0.1442*	0.0562
Model chi-square	36.49*** on 20 degree of freedom				
Correct prediction (%)					
Overall	93				
Diversification	60				
Non diversified	98				

Note: *, **, and *** indicates statistical significance at 10, 5 and 1% respectively.

and Cochran, 1983).

The chi-square, which tests the joint significant of the explanatory variables in this study, is statistically significant at the level 5% (Table 9). The estimated model correctly classified 93% of the respondents. The success rates for predication of adoption of diversification and non diversified enterprises are 60 and 98%, respectively.

On the basis of results obtained and shown in Table 9, the techniques described in the methodology section were applied and factors affecting diversification as a means of risk management are reported in this section. Variables NSTOCK, EXPLV, SAFETY, HOWIMP and NTECH are not significant (Table 9), all other variables were found to be statistically significant at the specified level of significance.

The positive estimated coefficient sign to the variables (Dummy, GENDER, PROD, OINCOME, VSALE, FTHEFT, and WSALE) indicate that the greater the values of these variables, the higher the tendency for farmers to diversify their enterprises. The negative sign for the remaining variables indicate the opposite implication of the previous explanation, that is, the greater the value of these variables, the lower the probability for diversified enterprise.

The positive sign of the FSIZE was as hypothesised. It indicates that family members are dependents on the farm. Responsibility and creativity increases as the farmer wants either to avoid risk or to obtain better income for the family. This makes it necessary for the family to diversify its enterprise, especially communal farmers.

The formal education level (EDU) has a negative coefficient estimate indicating that, *ceteris paribus*, the probability of diversifying risk deceases as the level of formal education of the farmers' increases; this implies that farmers preferred to specialise on the specific enterprise to maximise output. Bullock et al. (1994) and Vandeveer (2001) found education was negatively related to a farmer's willingness to take risk. However, Mohammed and Ortmann (2005) found that education was positively related to farmers' willingness to take risk.

The gender of the farmer was found to be positive and significant at 5% level, whereas, age was found to be negative and significant. This implies that female farmers are risk averse. Age indicates that specialisation as the farmer matures is most likely to be more commercialised. The negative estimate coefficient for age implied the decision of diversification. It appears, therefore, that older and more experienced farmers are less willing to diversify their enterprise. Farmers with such characteristics might have acquired enough knowledge through time to deal with income and risk without diversification. Results of the studies by Jarvie and Nieuwoundt (1988) and Vandeveer

(2001), however, indicate that younger farmers, or those with less experience, were less likely to diversify their enterprise.

Off-farm income (OINCOME) has a negative coefficient estimate implying that the more farmers engage in off-farm activities the less probability to diversify the enterprise. This may be due to the fact that time constraints to allow stretching to many enterprises. The off- farm income is also a good cash injection to the livestock farming especially for the emerging commercial farmers. They support their farms through their other income outside farm. The off- farm income helps many farm households as a means of diversification of risk. This negative estimate coefficient for this variable implies that farmers engage in off farm activities.

FSALES shows significant and negative estimated coefficient. This implies that there is a high frequency of sales in the livestock. This is a good proxy for good market opportunity for the livestock farmers. On the other hand, frequency of theft (FTHEFT) shows positive estimated coefficient. This implies that as the risk of theft gets high, farmers prefer to diversify. CREDIT indicates that negative and significant values show that farmers focus on one enterprise to get more return in order to increase the payment/debt commitment to the debtors.

Lastly, the puzzling result of the estimated coefficients on PROD and VSALE, shows significant levels, and are positive to influence diversification. Perhaps insured and non- insured category data were not found for this study. This might jeopardize the result of this variable, or this might suggest that a specific study is needed on the impact of productivity and value of livestock relationship to risk management strategy to obtain a more reasonable estimate.

CONCLUSIONS AND POLICY IMPLICATIONS

It was very surprising that none of the surveyed livestock farmers insured their livestock. As indicated in Table 1 farmers were aware of the importance of insurance. However, when they were asked why didn't they insure their livestock, 64.3% of commercial farmers and 82.8% communal farmers said, they did not see the importance of insuring. About 26.27% of commercial farmers and 17.2% communal farmers said that the insurance premium was unaffordable. This implies that the insurers need to increase campaign on increasing awareness on the role of livestock insurance to farmers. It requires the combined efforts of all stakeholders namely, governments, civic society organisations and the private sector. Furthermore, it is important to ask question; how can livestock farming in Namibia make a significant contribution to the viability of farming systems in the country to achieve the Millennium Development Goals without considering how to minimise risk in the farming? Is it impossible to support the farming industry? Therefore, it is important for good risk assessment and risk reduction strategies to be considered by Namibian livestock farmers in Omaheke and Otjozondjupa regions, regardless of the size of the property.

The statistically significant and negative estimated coefficient of the household characteristics at the specified significance level (such as family size, educational qualification, age, and off farm-income) implies that Namibian livestock industry growth was achieved with improved education, experience and support from other income as a strategy for diversifying risk. However, the positive relationship of FTHEFT and PROD implies that the sector is suffering from continuous risk of theft and requires quality production to get market access. Therefore, farmers need to follow effective risk management systems to achieve the required profit rate.

The negative statistical estimation of education attainment plays a role in creating insurance awareness and implies that farmers prefer to diversify their enterprise as a risk management tool, rather than buying insurance. On the other hand, the positive correlation of information toward insurance (which is captured by asking "How is insurance important to you?") among the livestock farmers in Omaheke and Otjozondjupa regions. The answer to this question reveals that there is a need for policy makers and insurers to design a programme to better educate farmers so that they can assess risk management tools and thereby increase their participation in insurance. The low level of education of many farmers in the study area may have negatively influenced the decision to purchase livestock insurance in addition to other factors such as not knowing about the provision of insurances, the premium being too expensive and so forth. The insurance companies in Namibia should intensify their advertising efforts and inform farmers of the importance of insurance in the industry. Currently, livestock farmers seem to follow diversification activities as alternative risk management strategies.

While the results of this study are encouraging, there remains considerable scope for refining and deepening the research.

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