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SA-TIED Working Paper #15 | May 2018



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ABSTRACT

Crop insurance is a sustainable risk management tool that farmers need for increasing the sustainability of their agricultural enterprises by reducing income risks. This paper reports on factors influencing farmers' interest in purchasing crop insurance. A sample of 150 maize farmers from the Hhohho and Lubombo regions of Swaziland were interviewed using structured questionnaires. The collected data was analysed using the probit model and the relevant factors were identified. The obtained results indicate that gender, marital status, occupation, education, location, savings and farming experience all figure among the influences.

Keywords: Swaziland, crop insurance, risk management, sustainability

1 INTRODUCTION

Agricultural production is subject to a number of risks, including drought, disease and floods, among others. Although agricultural risks are experienced by farmers in both developing and developed countries, their impacts may have different consequences according to the country (World Bank 2005). These risks can affect production choices, agricultural production and farm incomes, which affect the livelihoods of people dependent on agriculture. Further, they may impede future investments and the growth of agricultural businesses. Therefore, it is imperative to understand how risks affect agricultural production and how they can be mitigated. Agriculture is an important sector in sub-Saharan Africa, and serves as a stimulus for growth, provision of food security and assisting in poverty reduction (FAO 2000). However, food insecurity and poverty are still pressing issues in countries such as Swaziland, which is the focus of this paper. According to Cervantes-Godoy et al. (2013), the reason for food insecurity and poverty is the susceptibility of agriculture to production, policy and price risks.

The nature of agricultural production makes risk management a vital tool to protect farmers against potential losses. Crop insurance is one such tool that farmers need to maintain the sustainability of their agricultural enterprises, but there has been limited focus on the demand for crop insurance. In Swaziland the crop insurance industry is still underdeveloped, and there is an empirical gap in knowledge of the factors influencing farmers' interest in purchasing such insurance. This paper identifies those factors amongst maize farmers in Swaziland. It provides an understanding of farm households' need for crop insurance as part of a search for the best ways of protecting farmer's livelihoods from agricultural risks and avoiding ineffective risk management strategies. The paper is structured as follows: Section 2 presents the background and discussed the relevant literature, Section 3 discusses methods and procedures, Section 4 presents the results and discussion, and Section 5 offers conclusions and recommendations.

2 BACKGROUND AND LITERATURE REVIEW

Swaziland is a small landlocked country with a total land area of 17 364 square kilometres. It is predominantly rural country, with the majority of the people dependent on subsistence agriculture for their livelihoods. Its land tenure system consists of Swazi Nation Land and Title Deed Land. Swazi Nation Land is held in trust for the Swazi people by traditional authorities, and about 90% of the countries maize is grown on it. Farmers have rights to use the land, but cannot use it as collateral for obtaining credit or other inputs. Title Deed Land is owned by private companies and individuals (Magagula et al. 2007).

Maize is the staple food and the dominant crop for the Swazi people (Sihlongonyane et al. 2014), so it is used to measure food availability. Any maize shortage in the country increases the proportion of the population that is below the minimum level of dietary energy consumption. Food production has been declining in the past years, such that the country depends on food imports to overcome production insufficiencies. Most maize farmers have no access to irrigation, so they are heavily dependent on rainfall production fluctuates according to prevalent weather conditions. Yields vary among the four agro-climatic zones (the Highveld, Middleveld, Lowveld and Lubombo Plateau). The Highveld region has the highest yields and the Middleveld is the moist region (MOA 2013); together they produce the most maize.

According to the National Maize Corporation NMC (2016), there was a major decline, of 47%, in the area planted for maize from 2014/15 to 2015/16. This was despite the government's intervention of providing input subsidies to the major maize-growing areas. Production declined drastically, by 59% from 2014/15 to 2015/16. This was mainly caused by the El Niño-caused drought that hit the country in the production year 2015/16. On the other hand, consumption of white maize increased by about 1.2%, meaning that there was a national deficit of maize, which was met by importing 28,043 metric tonnes of maize. Self-sufficiency declined from 62.2% in 2014/15 to 25.2% in 2015/16.

2.1 The role of crop insurance

Farmers use various risk-management tools, ranging from diversification of farm products to financial instruments such as agricultural insurance to provide protection against losses from agricultural risks. Agricultural insurance transfers the risk of loss from one entity to another in exchange for a premium, in order to prevent a large and possibly devastating loss to a farmer. It has the potential and capacity to address some of the constraints faced by farmers, by reducing uncertainty and by changing farmers' behaviour. Agricultural insurance is not limited to crops, but can refer to livestock, aquaculture, forestry and greenhouses (Ramiro 2009). Crop insurance is an instrument whereby participant farmers pay premiums, and lodge claims in cases of losses through insured events (Rao et al. 2006); farmers are compensated for crop yield losses and are thus better able to manage fluctuations in revenue caused by both price and yield volatility. In developing countries, not only are crop insurance programmes there to provide cover against potential losses, but also to promote other farm goals, such as improving access to credit, promoting the production of high quality crops, and providing more stability to the agricultural sector, enabling farmers to invest in riskier but potentially more productive activities. Insured farmers receive pay-outs after crop losses and this helps them avoid having to sell assets. Improving risk management in agriculture can greatly assist in enhancing productivity (World Bank 2005).

Farmers can also take on suitable future or forward contracts at the beginning of the cropping season, which can hedge against price risks (Piot-Lepit and M'Barek 2011). With the frequent occurrence of events such as droughts, farmers may be responsive to crop insurance; instead of losing their produce they may be more willing to take actions to ensure their livelihood. It is important to understand a producer's behaviour when faced with risks. Risk perception plays a vital role in production and the investment behaviour of agricultural producers (Abebaw et al. 2006). Farmers also have different preferences for crop insurance.

2.2 Agricultural insurance in different countries

Agricultural insurance markets were first initiated over 200 years ago in Europe in the form of privately offered cover against peril events such as hail and livestock mortality. Early insurance schemes were mainly provided by small mutual companies which offered coverage on single or named perils (Gardner and Kramer 1986). However, a rapid expansion, and the development in the range and scope of insurance products has only been seen in the past fifty years. Expansion resulted from various factors: extensive government support, subsidized premiums, public provision of reinsurance services, and subsidized delivery and loss adjustments expenses (Mahul and Stutley 2010). Smith and Glauber (2012) reported that in many developed countries agricultural insurance is now offered along with other domestic support programmes and index-based insurance products. The United States crop insurance programme is the largest in premium volume in the world, and similar programs are also available in countries such as Canada, Spain, Italy and Japan. In some other developed countries, such as Slovenia, Austria, France and The Netherlands, these programmes are still being introduced and expanded (Council of the European Union 2011).

In developing countries, several governments have tried to promote crop insurance and other types of agricultural insurance by providing agricultural premium subsidies, which has made them move from small-scale pilot programmes to large-scale agricultural insurance programmes. In most African countries, even though agricultural insurance for smallholder farmers is mainly based on small pilot studies (on which the literature is limited), weather index-based insurance has been used as a viable risk management tool. In Nigeria, an agricultural insurance scheme is accessible to farmers and provides cover against perils such as drought, fires, wind, pests and diseases. The sum insured under this scheme is computed using the expected revenue from the expected yield (Nnadi et al. 2013). This scheme is also linked to credit and loan schemes providers and it is mandatory for farmers to take loans from these providers.

According to (FESA 2014) weather index-based insurance has a huge potential for managing agricultural risks in sub-Saharan Africa. However, challenges exist in terms of improving its design. Involving farmers in the

design process would give them an incentive to purchase the insurance. In South Africa, agricultural insurance is a method of risk management that has been available for almost a century. According to Burger (1962), it started in 1916 when a group of farmers in the Cape Province founded their own organization for insuring wheat stacks against fire. The second largest crop insurance scheme was established by a number of farmers in Ficksburg in 1929, who ran a small, unregistered mutual concern (Doyer 2013). Nowadays, companies such as the Land Bank provide agricultural insurance in South Africa. Progress in helping emerging farmers in agriculture has been very slow, mainly because of the lack of adequate support services. Successfully establishing emerging farmers in agriculture is also dependent on the involvement and cooperation of the various stakeholders (Land Bank 2013). In Malawi a three-phase drought index-based insurance exists. It was designed in 2005, and it is coupled with providing credit and improved farm inputs such as seeds and fertilizer. In the event of a drought, the farmer pays a fraction of the loan and the insurance company pays the remainder (World Bank 2011).

In Swaziland, agriculture is, as mentioned above, an important sector of the economy and farmers are encouraged to take up agriculture insurance to safeguard their investments. Companies such as the Lidwala and Swaziland Royal Insurance Company provide both livestock and crop insurance. They provide cover on maize, sugar-cane and baby vegetables, and against perils such as drought, hail, fire, frost damage, windstorms and uncontrollable pests and diseases. These companies usually require to know the location of fields, the type of crops planted, the basis of the cover selected, and confirmation that the fields are fenced, as well as projections showing the expected revenue and the total costs incurred (SRIC 2016). However, the uptake of agricultural insurance in Swaziland has remained low over the years. It is mostly sugarcane farmers that have crop insurance are sugar cane farmers, mainly because they are required to do so when taking credit from financial institutions. The agricultural insurance industry in Swaziland is still underdeveloped, however, so it is important to understand the demand side of crop insurance and determine what can be done to improve the farmers' interest in purchasing it.

2.3 Factors influencing farmers' interest in purchasing crop insurance

Makki and Somwaru (2001) argued that the decision to purchase crop insurance is influenced by the premium level, risk level, expected indemnity, and other available risk management tools. Several studies have reported that an increase in insurance premiums has the potential to reduce farmers' participation in crop insurance (Goodwin and Smith 2003; Knight and Cobble 1997). McCarthy (2003) revealed that farmers in Morocco with a relatively higher income were more interested in purchasing crop insurance than those with lower income. Sherrick et al. (2003) reported that some of the factors that influence crop insurance demand are the costs and returns of crop insurance, financial risks, yield and other business-related risks, farm size, coverage levels and forms of diversification. Aidoo et al. (2014) studied crop insurance as a risk management tool among Ghanaian arable crop farmers. The study identified the critical factors that influence the premiums farmers are willing to pay, and found that the most farmers were interested in purchasing crop insurance, with the factors that influenced their decisions being the land tenure system, the age of the farmer, and the farmer's education level. The study further revealed that a government subsidy was required, since farmers had a preference for low premiums, which are likely not to be feasible from the perspective of private insurance providers.

Enjolras et al. (2012) analysed the demand for crop insurance in Italy and France. The study revealed that the farmers' decision to purchase crop insurance is influenced by the farmers' aversion towards risk, the intrinsic characteristics, and the performance of their own agricultural enterprises. The study revealed an increase in premium levels in Italy when compared to France, because there were public subsidies offered in France where catastrophic risks were included in the policies. Without that intervention, insurance tends to be costlier and less profitable to the insurance companies. Shashi Kiran and Umesh (2015) found that Indian maize farmers were not aware of the products and procedures of crop insurance, which contributed to

limited demand for it. The inability of farmers to assess the benefits of crop insurance is one factor that contributes to limited demand for crop insurance (Gamdo and Zilberman 2008). According to Barnett et al. (1990) the expected rate of return on insurance is an important factor when determining the demand for crop insurance. The high prevalence of crop-damaging weather occurrences is likely to continue to push the demand for crop insurance for the coverage of losses (FAO 2005). Feng (2004) and Shi (2008) argue that even if 100% coverage would be provided as protection to historical yields, without any subsidy only 25 per cent of farmers would purchase crop insurance.

Ghazanfar et al. (2015) investigated the factors that influence farmers' decisions to purchase crop insurance in Pakistan. Their findings revealed that the majority were interested in insurance, but a large number of farmers still no interest. The study showed that low literacy rates and low awareness of crop insurance and its expected benefits might be the reasons for this. Farmers with more loss experience were more interested in purchasing crop insurance because they felt insecure about their future yield production, so they felt it is way better to have crop insurance to avoid losses from future climatic hazards.

Balma Issaka et al. (2015) studied the maize farmers' interest to participate in the crop drought index market for insurance in Ghana. The study revealed that education, access to credit, and farmers' experience with other forms of insurance, are the most significant factors in determining their interest in insurance. Damage incurred due to the drought increased the probability of farmers purchasing crop insurance and the number of non-farm income sources reduced the likelihood of them deciding to do so. To encourage crop insuring, there is a great need to integrate the insurance into micro finance. Koume and Komenan (2012) reported that the age of farmers, farming experience, household size, farm income and farm size had a significant influence on farmers' interest to purchase crop insurance among the Ivorian cocoa farmers.

3 METHODS AND PROCEDURES

The focus of the study was on two administrative regions of Swaziland: Hhohho and Lubombo regions. The Hhohho region is located in the western part of the country, with a climate characterized by wet summers and dry winters. Annual rainfalls are the highest in this region, between 1000 and 2000 mm per year. The Lubombo region is in the eastern part of the country and is the driest region, with a climate characterized by hot temperatures and rainfall from 500 to 900 mm per annum. According to FANRPAN (2003), Hhohho is one of the highest maize producing regions in the country, whilst Lubombo is the lowest. Crop production in the Lubombo region is susceptible to drought and it is mainly practised by smallholder farmers under rain-fed conditions. Even though the Lubombo region is overall dry, the amount of rainfall varies according to altitude, with an area such as Maphungwane receiving more rainfall than others and producing more maize.

Primary data was collected in these two very diverse regions, in one area of each. Sigangeni area was selected in the Hhohho region mainly because it is one of the highest maize producing areas in the region, and the majority of farmers there are maize sellers. Maphungwane was selected in the Lubombo region. In selecting respondents, the snowballing sampling method was used (Goodman 1961). One farmer in each area was identified, who assisted in identifying other farmers who also produce surplus and sell their maize. The final sample size was 150, with 75 households interviewed in each area. Data was collected through face-to-face interviews using a pre-tested questionnaire. The face-to-face interview was preferred over the use of telephone and mail interviews, due to the inconsistency and unpredictability of the use of internet and mobile phones among farmers in the rural areas. The questionnaire comprised questions about household and farm characteristics, socio-demographic factors, and crop insurance. The survey targeted maize farmers who usually have a surplus to sell to the National Maize Corporation or individual buyers. One enumerator trained by the researcher assisted in the data collection process. Household heads and other relevant family members involved in farming in the households were interviewed. Younger respondents and

older family members assisted each other where it was necessary. To ensure there were appropriate responses for all questions, the researcher checked all the questionnaires on a daily basis.

The factors that influence farmers' interest to purchase crop insurance were estimated using the probit model, using the maximum likelihood method, based on information about farmers who are interested and not interested in purchasing crop insurance. Factors used in the analysis, based on literature, included socio-economic factors, farming characteristics, risk coping strategies and crop insurance awareness.

The probit regression model

Probit models were used to identify those factors that influence farmers' interest to purchase crop insurance, and to identify factors across the whole sample that differentiate between those farmers who are interested and those who are not. This regression model has been the most frequently used model in determining such factors (Ellis 2016). The probit model is suitable for dichotomous dependent variables that takes a value of one or zero (Mfungwe 2012). The general probit model can be expressed as in Equation 1.

$$Y_i^* = \beta_0 + \sum_{i=1}^n \beta_n X_i + \mu_i \tag{1}$$

where Y_i^* can be defined as a latent variable not observed and a dummy variable defined by Y_i is what is observed;

Y_i = the dichotomous dependent variable expressed as follows: $Y_i = 1$, when a farmer is interested in purchasing crop insurance, and $Y_i = 0$, when a farmer is not interested in purchasing crop insurance;

β_0 = the intercept;

β_i = the regression coefficient that explains the probability of farmers' interest in purchasing crop insurance;

X_i = independent variables, with an assumption that $\beta_n X_i$ is a normally distributed random variable;

μ_i = the stochastic error term.

The dependent variable is the interest in purchasing crop insurance. The independent variables used in this study include socio-economic factors, farm characteristics, risk-coping strategies, loss experience, and awareness of crop insurance. The probit model results include coefficients that give only the direction of the relationship between the independent and dependent variables. To interpret the relationships in terms of interest in purchasing insurance or not, the marginal effects were used. The marginal effects for the estimated coefficients is expressed in Equation 2.

$$\frac{\partial pr(y_i=1|x_i;\beta)}{\partial x_{ij}} = \frac{e^{x'\beta}}{[1+e^{x'\beta}]^2} \cdot \beta_j \tag{2}$$

4 RESULTS AND DISCUSSION

4.1 Differences in respondents' characteristics

This section discusses the differences between farmers who were interested in purchasing crop insurance and those who were not, with respect to their socioeconomic, household and farming circumstances.

Socioeconomic characteristics

Of the 150 respondents, 56.5% of the female farmers were interested in purchasing crop insurance, compared with only 44.8 % of male farmers (see Table 1). The latter tend to be more confident with their farming methods and risk-coping strategies, whilst female farmers tend to be more risk-averse. Typically, more single farmers were interested in purchasing crop insurance than married ones. This implies that Swazi farmers with fewer responsibilities are better able to afford insurance. Respondents who had attained higher education (tertiary and high school), as well as those with primary education, were more interested in

insurance than those with no formal education. This may suggest that educated farmers have a better understanding of the use and benefits of crop insurance. Typically, respondents who had other major occupations besides farming were more interested in insurance than those for whom farming was the major occupation.

Table 1: Socioeconomic characteristics of farmers

Socioeconomic characteristics		% interested	% Not interested
Gender	Male	44.8	55.2
	Female	56.5	43.5
Marital status	Single	68.0	57.6
	Married	32.0	42.4
Education	No formal	54.2	46.9
	Primary school	54.7	53.8
	High school	45.8	53.1
	Tertiary	45.3	46.2
Occupation	Farming only	44.3	81.0
	Other businesses	55.7	19.0

Source: Own compilation

Household characteristics

Farmers interested in crop insurance were younger, with larger households and lower farming incomes when compared to those not interested. This may imply that younger farmers are more willing to adopt new technologies. Although they have lower incomes than the uninterested farmers, they value the benefit of crop insurance. Therefore, educating younger farmers better about those benefits is likely to increase the adoption of crop insurance in the country.

Table 2: Household characteristics of farmers

Household characteristics	Interested (mean)	Not interested (mean)
Age of household head (years)	47.59	57.32
Household size	7.88	7.01
Income	E6105.06	E10585.14

Source: Own compilation

Farming characteristics

Farmers interested in purchasing crop insurance had less farming experience and larger farms than those not interested, implying that those with more farming land prefer purchasing crop insurance to protect their agricultural businesses and minimize risks in order to ensure the livelihoods of their families. Of the 150 respondents, 127 grew only maize and 50.4% of those farmers were interested in insurance. Of the 49 with savings, 71.4% were interested in insurance. This implies that encouraging farmers to save is likely to increase the uptake of crop insurance in Swaziland. Further, farmers who had more loss experience and those familiar with crop insurance were more interested in purchasing crop insurance. However, those respondents not interested had more farming education, had more access to credit, and grew maize as well as other crops, than the interested ones.

Table 3: Farming characteristics

Farming characteristics		Interested	Not interested
Farming experience (years; mean)		24.24	28.92
Farm size (hectares; mean)		2.48	2.32
Receive farming education (%)	Yes	49.5	55.9
	No	50.5	44.1
Access to credit (%)	Yes	47.2	53.5
	No	52.8	46.5
Savings (%)	Yes	71.4	42.6
	No	28.6	57.4
Crop type (%)	Maize only	50.4	46.2
	Maize and other	49.6	53.8
Loss experience (%)	Yes	53.6	36.4
	No	46.4	63.6
Crop insurance awareness (%)	Yes	60.0	51.1
	No	40.0	48.9

Source: Own compilation

4.2 Empirical results

The probit model was used to determine the factors that influence farmers' interest in purchasing crop insurance. It enables an estimate of the probability of a binary response based on one or more independent variables. To run the probit model, the multicollinearity test was conducted to ensure that there is no multicollinearity between the independent variables. The variance inflation factor (VIF) of all the independent variables was below the threshold of 10.00 and the tolerance values were above 0.10. This implies that multicollinearity was not present (Hair Jr et al.1995). Since the dependent variable has a binary response (yes = 1, no = 0), the dependent variable was interest to purchase crop insurance. The model is specified as:

$$\text{Pr}(\text{INTRST})= f(\text{AGEHH}, \text{AGE2HH}, \text{GENDER}, \text{HS}, \text{MARRIED}, \text{WASMARRIED}, \text{OCCUP}, \text{HEduc}, \text{LEduc}, \text{LOCATION}, \text{FARMEXP}, \text{MEMBER}, \text{FARMEDUC}, \text{CRED}, \text{EY}, \text{CROPTYPE}, \text{AMOUNTCONS}, \text{SAVINGS}, \text{FAM_CI}, \text{LOSSEXP}).$$

That is, the probability of being interested in purchasing crop insurance depends on the set of explanatory factors. Table 4 presents the results of the probit estimations of the factors that have a significant influence. The model correctly predicted 80.7% of the observations, with significant chi-squared of 69.46. Eight out of the twenty variables had coefficients that were significantly different from zero. Three of the variables were positively associated with the probability of being interested in purchasing crop insurance, namely, the occupation of the household head, the location of the farmer, and possessing savings. The other five significant factors were negatively associated with the probability of being interested in purchasing crop insurance, namely, gender of the household head, marital status, education level, and farming experience.

Three of the significant variables had the expected signs. Firstly, the results suggest that having farming as the major occupation has a considerable marginal effect on increasing the probability of being interested in insurance. It shows that a farmer dependent on farming is 21% more likely to be interested in insurance than a farmer who has other sources of income. Respondents with other major occupations had a source of security, through income from other sources, and hence less interest in purchasing crop insurance. The next

important factor is location. This variable has a higher marginal effect, which indicates that when the farmer is located in the Lubombo region this might increase the chance of being interested in purchasing crop insurance significantly. A farmer in the Lubombo region is 29.8% more likely to be interested in insurance than one in the Hhohho region, because the region is associated with higher perceived risks resulting from the drier conditions. Local conditions, such as climate and type of soil, influence the crop insurance decisions that farmers make (Barry et al. 2004). This implies that crop insurance providers in the country should invest more time and resources promoting insurance in more climatically vulnerable locations. The ability to save is another important variable which had a higher marginal effect, meaning that having savings might increase the chance of purchasing crop insurance. A farmer with savings is 24.5% more likely to be interested. This implies that maize farmers in Swaziland who are able to save have an incentive to maintain their saving ability, since they mainly use them for paying school fees and buying planting materials. This can also imply that these farmers produce more, hence, their saving ability may also indicate that they can better afford crop insurance. These results conform to Aidoo et al. (2015), who found that the amount of savings per annum had a positive effect on insurance purchase, since premiums will be paid from current income or accumulated income, which can be represented by savings. This may imply that future uptake of crop insurance in the country can be accelerated among maize farmers when their level of savings improves.

Table 4: Probit regression results

Factor	Coefficient	Marginal effects
Constant	-0.090 (0.954)	
Household characteristics		
Age of household head (years)	-0.003 (0.012)	-0.001 (0.003)
Age of the second household head (years)	0.016 (0.011)	0.004 (0.003)
Gender (dummy)	-0.698** (0.294)	-0.182** (0.073)
Household size	0.045 (0.033)	0.012 (0.009)
Married (dummy)	-0.230 (0.384)	-0.060 (0.100)
WasMarried (dummy)	-1.027** (0.523)	-0.267** (0.132)
Occupation (dummy)	0.805*** (0.298)	0.210*** (0.072)
Higher Education level (dummy)	-0.771* (0.440)	-0.201* (0.111)
Lower education level (dummy)	-0.773* (0.421)	-0.201* (0.106)
Farming characteristics		
Membership in farmers' association/union (dummy)	0.246 (0.468)	0.064 (0.122)
Location (dummy)	1.146*** (0.280)	0.298*** (0.060)
Receive farming education (dummy)	0.136 (0.287)	0.035 (0.074)
Access to credit (dummy)	-0.024 (0.311)	-0.006 (0.081)
Farming experience (years)	-0.020* (0.011)	-0.005* (0.003)
Expected yield (number of 100kg bags)	-0.003 (0.004)	-0.001 (0.001)
Crop type (dummy)	-0.085 (0.375)	-0.022 (0.098)
Maize consumed (number of 100kg bags)	0.013 (0.011)	0.003 (0.003)
Coping strategy		
Savings (dummy)	0.943*** (0.318)	0.245*** (0.076)
Crop insurance awareness		
Familiarity with crop insurance (dummy)	-0.341 (0.487)	-0.089 (0.126)
Loss experience		
Loss experience (years)	-0.104 (0.077)	-0.027 (0.020)

% Correctly predicted	80.8%
Model CHI-SQ	69.46***
N	150

Source: Own compilation

The results indicate that the marginal effect of the marital status of the household head on the probability to purchase crop insurance is the most important of the negative factors, having a considerable marginal effect on decreasing probability of interest. A farmer who is divorced or widowed is 26.7% less likely to be interested in insurance than a farmer who is single. Typically, most widowed household heads in Swaziland are females. In rural areas, the husbands are usually the ones who work and provide for their families, while the wives stay behind and take care of the households. If the husband dies, the wife is left to support the family. Without a non-farming income flow, widows may be less likely to be interested in adopting crop insurance, given the cost. This implies that encouraging widows into crop insurance may require developing widow-friendly/-sensitive products.

The marginal effect of the education level on probability of insurance purchase is the next important one among the negative factors. A higher education level has a considerable marginal effect on decreasing probability. A farmer who has attained the higher level of education is 20.1% less likely to be interested than one with no formal education. The lower education level also has a marginal effect of decreasing the probability of being interested in purchasing insurance. A farmer with a lower level of education is also 20.1% less likely to be interested in purchasing crop insurance than one with no formal education. This implies that more educated farmers have knowledge and confidence in other risk-coping strategies that they employ. In Swaziland most of the educated household heads are employed: some have government jobs and others have other businesses; their ability to get other incomes provides them a source of security, so they are not dependent on farming for their livelihoods. This explains their lack of interest in purchasing crop insurance.

This conclusion is in line with that of Kwadzo et al. (2013) who also observed a negative correlation between farmers' educational level and their willingness to purchase market-based insurance and suggested that these farmers were more exposed to other risk management practices. Black and Dorfman (2000) also suggested that better educated farmers are more able to manage their farms and are exposed to various risk management practices, and are therefore less likely to purchase crop insurance. However, these findings are in contrast with those of Danso-Abbeam et al. (2014) who found that education has a positive significant effect on the probability of farmers to purchase crop insurance.

Farming experience has a considerable marginal effect on decreasing the probability of being interested in purchasing crop insurance. That is, every additional year in farming decreases the probability of being interested in insurance. More experienced farmers are 0.5% less likely to be interested in purchasing crop insurance. Hence, their unwillingness or slowness in adopting new technologies. This conforms to the findings of Danso-Abbeam et al. (2014) that there is a negative relationship between farming experience and interest in purchasing crop insurance. Older and more experienced farmers in Swaziland tend to be confident and content with their current risk management practices. Kouame and Koumenan (2012) estimated a positive coefficient for farmers' experience in cocoa-farming, but only up to a certain level, after which the effect of farming experience becomes negative. Gender also has a considerable marginal effect on decreasing the probability of being interested in purchasing crop insurance. That is, a male farmer is 18.2% less likely to be interested than a female farmer. Male farmers in the country tend to be less risk-averse, with more confidence in their planting methods and risk-coping strategies. Other variables, such as age, household size and expected yield were not generally significant, probably because these factors have not direct, affective relationship with an interest in purchasing crop insurance.

5 CONCLUSION AND RECOMMENDATIONS

The study revealed that there is limited knowledge about crop insurance among maize farmers in Swaziland. Farmers had to be given a brief description of what crop insurance is and how it works. The majority of maize farmers were, however, interested in purchasing crop insurance. This implies a lack of education and promotion about insurance in the country; education might increase its adoption. The probit results indicate that various factors – gender, marital status, education, occupation, location, farming experience, and savings – significantly influenced farmers' interest in insurance. Other factors – gender, marital status, education, and farming experience – had a reducing effect on the probability of a farmer being interested in purchasing crop insurance. However, occupation, location and savings had an increasing effect on probability.

Policy makers need to consider crop insurance support policies, such as crop insurance premium subsidies. Crop insurance programmes should be tailored to the needs and constraints of farmers. The government can also combine its incentives with farmer support services, which would result in increased production and a transition from subsistence to commercial farming. Further research could investigate the factors influencing interest in purchasing crop insurance with regard to farming different crops. The willingness to pay for crop insurance could be correlated with different crops and their associated risks.

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Acknowledgments

This paper was produced within the framework of SA-TIED's Young Scholars Program. The program is designed to encourage promising university students to pursue careers in research.

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This paper was prepared as an output for the Towards Inclusive Economic Development in Southern Africa (SA-TIED) project and has not been peer reviewed. Any opinions stated herein are those of the authors and not necessarily representative of or endorsed by IFPRI. The boundaries, names, and designations used in this publication do not imply official endorsement or acceptance by the authors, the International Food Policy Research Institute (IFPRI), or its partners and donors.