RISK MANAGEMENT BEHAVIOR OF AGRICULTURAL PRODUCERS: PREFERENCES AND PERCEPTIONS

by

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ABSTRACT

The objective of this paper is to examine factors affecting the risk management behavior of Western Canadian grain producers. The first part analyzes factors affecting perceptions of crop insurance. Data for the study is generated from a survey of agricultural producers in Western Canada, and a probit model is used for estimation. Results show that if farmers receive fair crop insurance assessments, quick payments, and have a high knowledge level of crop insurance, they are more likely to have a more positive perception of crop insurance. The second part examines factors that could be influencing the frequency by which agricultural producers hedge their price risk with futures. The same data and estimation method are used. Results show that if farmers use forward contracts and options to hedge price risk, speculate with futures, place a high importance on low brokerage fees, or have larger farms, that are more likely to hedge.

Keywords: Crop Insurance, Hedging, Futures, Agricultural Risk, Survey, Probit Model

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CHAPTER 1

INTRODUCTION

The use of risk management instruments by agricultural producers in Western Canada has become more widespread in recent decades. Crop insurance is one such risk instrument that many producers often describe as useful for production risk management. There are also many other price risk management instruments such as forward contracts, futures, options, etc. that are used by agricultural producers. This study consists of two parts. Part one evaluates agricultural producers' perceptions of crop insurance, and part two identifies factors that could be influencing agricultural producers' frequency of hedging with futures. Each part is explained below.

The objective of part one of the study is to try to determine the factors affecting perceptions of crop insurance in Western Canada. Two variable groups are identified: crop insurance background, and demographics. Data was generated from a survey of agricultural producers in Saskatchewan and Manitoba, (Canada) and the model was estimated using the probit method. A sample size of 293 respondents was used for the study.

The second part of the study explored frequency of using futures for hedging price risk. Agricultural producers may attempt to manage price risk in a variety of ways such as lowering debt, diversifying, using government programs, as well as using forward contracts, hedging with futures, or hedging with options. The objective of this part is to better understand the factors related to futures hedging by agricultural producers in Western Canada. Grain producers in Saskatchewan and Manitoba were surveyed about

the risk management practices employed on their farms. The same survey data from part one are used for this analysis and the model is also estimated with the probit model.

This study is organized as follows: Chapter 2 uses survey data to determine factors affecting producers' perceptions of crop insurance, and Chapter 3 uses the same survey data to estimate the frequency by which agricultural producers use the futures market to hedge their price risk. The final section, Chapter 4, summarizes the key findings of the study.

CHAPTER 2

PERCEPTION OF CROP INSURANCE BY AGRICULTURAL PRODUCERS

Introduction

Agricultural producers are faced with a number of risks that can be sudden and large, especially when caused by uncontrollable natural perils such as weather, disease, or pests. Hoag (2009) mentions that risk is often managed through four alternatives: avoiding risk, reducing risk, retaining risk, or transferring risk. Crop insurance is a often available for agricultural producers wishing to transfer their production risk to a crop insurance company. Canadian crop insurance is run by each province's crop insurance corporation. These are non-profit government corporations and are non-political. The sole purpose of the corporations is to provide low cost and high quality crop insurance to producers. In the province of Manitoba, Canada, where part of the survey for this study was undertaken, the most common levels of coverage available to producers are 50%, 70%, or 80% of probable yield. Saskatchewan has an additional option of 60% of probable yield. The insurance is available for many different crops, and producers may choose the coverage level to fit their budget and farming operations. In both Manitoba and Saskatchewan 60% of the cost of production insurance is paid for by the government, and the producers must cover the other 40%.

Several components must be met in order for a crop insurance program to be successful. Government subsidies, as described above, aid to keep participation rates of producers high. When participation is high, the cost to administrator of the program is lowered, therefore lowering premiums charged to producers. High participation rates

also help to solve the problem of adverse selection which may result from producers insuring only when facing higher risk (Luo, Skees, and Marchant, 1994).

Perceptions are often formed through the process of attaining knowledge, awareness, experience, and then forming opinions. The process by which agricultural producers form perceptions of crop insurance has not been examined exhaustively. Therefore, the purpose of this paper is to explore perceptions of crop insurance held by Canadian agricultural producers in the provinces of Manitoba and Saskatchewan, and this information may be useful to crop insurance corporations when developing new products for crop insurance, or improving existing policies. The introduction here is followed by a background section on crop insurance, followed by past literature, data, methodology, results, and then a summary.

Crop Insurance Background

Crop insurance has over a 100 year history in North America, although purchases of crop insurance were relatively insignificant, until crop insurance began to be more widespread around 1960. Crop insurance was developed to deal with the income instability and high risks associated with agricultural production. Instability in agriculture is often due to production risks such as crop disasters, often caused by adverse weather, and sometimes caused by pests and disease (Ray, 1980; Hueth and Furtan, 1994). If producers do not purchase crop insurance to protect themselves against these risks, lenders may be reluctant to extend credit. In North America, crop insurance has been one of the most successful risk management and longest running stabilization programs for farmers (Boyd et al 2011). Boyd et al. (2011) state “multi-peril crop insurance, the most

common type of crop insurance, typically insures producers against yield losses due to natural causes such as weather (e.g. drought, excessive moisture, wind, snow, frost), insects and disease."

In the United States, the value of crop insurance policies purchased has increased from about $400 million to $1.2 billion, from 1981 to the late 1990's (Glauber 2004). The participation rate was low in the 1980's and early 1990's likely because of two main problems associated with crop insurance: adverse selection (when only the more risky farmers tend to buy crop insurance) and moral hazard (when farmers engage in more risky practices after purchasing crop insurance). Producers may sometimes feel that because crop insurance has been purchased, they can afford to have larger losses and take more risk because the insurance will cover these losses.

Crop insurance in the United States was established by the Federal Crop Insurance Corporation (FCIC) in 1938, and it is part of the United States Department of Agriculture (USDA). The Federal Crop Insurance Reform Act of 1994 in the U.S. increased the level of premium subsidies and mandated crop insurance participation for farmers who were eligible to receive certain farm program benefits. When the 1996 Farm Act removed the link between insurance participation and government farm program benefits, new insurance products were introduced that allowed farmers protection against both yield and price risks (Makki and Somwaru, 2001). The Federal Crop Insurance Corporation (FCIC) has expanded crop insurance choices. Choices now include yield insurance, alternative revenue insurance products, group insurance, increased coverage levels and premium subsidies, and the FCIC has been managed by the Risk Management Agency (RMA) since 1996.

Past Literature

Crop Insurance Background

The conditions for successful agricultural insurance include acceptable level of demand for crop insurance, capability and willingness of the insurer to pay customer claims, and the capability to meet insurability conditions (Shaik, Barnett, Coble, Miller, and Hanson, 2006). These conditions should be met if agricultural producers are to have a relatively positive perception of crop insurance. Some surveys have been administered in the United States to try to determine farmers' preferences for crop insurance attributes. Farmers' preferences for flexibility dominate both the type of insurance and the coverage level preferred. "Revenue insurance demand is greater by those who are larger, younger, and farm in more separate locations." (Sherrick et al 2003). Their study also showed that farmers would like more choices regarding which coverage level they can choose. As more choices of crop insurance have become available in the United States and Canada, some participation patterns have changed. This may be because the insurance policies now available are better at catering to producers' different risk profiles. Farmers are now better able to choose the type and level of coverage they prefer, and ultimately how much they are willing to spend on crop insurance.

Shaik et al (2006) note that crop insurance policies must have the desired features that farmers prefer, otherwise farmers will not purchase the insurance. Makki and Somwaru (2000) address the choice among insurance products using insurance data compiled by the USDA's Risk Management Agency. The cost of the insurance policy is a large factor when farmers choose their insurance products. The insurance premium

must be affordable, otherwise farmers would choose other risk management strategies. A subsidy to farmers could provide more incentive to choose crop insurance over other risk management techniques (e.g. use of forward contracts and derivatives/hedging, reducing debt levels, diversifying production).

In some areas of Canada, over 80% of producers choose crop insurance to reduce their production risk. Government subsidies in Canada help to reduce the adverse selection problem because there is a higher degree of producer participation, meaning that both high and low risk producers are purchasing insurance, and thereby spreading and lowering the administration costs across more producers. When a producer has a positive experience with crop insurance (receive a fair claim assessment, receive claim payment expediently, etc) they are more likely to have a positive perception towards crop insurance (Sherrick et al 2004).

Demographics and Crop Insurance

Perceptions of crop insurance may be related to farm size and demographics. The number of farms operating in Canada has continued to decline over the past number of decades, but these farms are producing more, according to statistics from the 2001 and 2006 Canadian Census of Agriculture. As farm numbers drop, the average size of a Canadian farm has increased from 676 acres to 728 acres. Also, the average age of farm operators has continued to increase. The average age increased from 49.9 in 2001 to 52.0 in 2006. Since 2001, more farm operators are working off the farm and more are working longer hours per week. In 2006, Canada had 5,902 farms with $1 million or over in gross farm receipts. While still a relatively small proportion of all farms, this was a significant

increase, going from 1.8% in 2001 and 35% of total receipts to 2.6% and 40% of total receipts in 2006.

Sherrick et al (2004) surveyed 3000 farmers on factors such as level of business risk, importance of risk management, debt use, age and education, tenure, expected yield, farm size, livestock enterprises, and non farm income. This study found that participation in crop insurance was dependent on risk, risk attitude, financial structure, level of returns and asset size. They found that users of crop insurance have significantly larger farm sizes, older ages, higher debt-to-asset ratios, greater leasing of farmland, higher perceived risk, higher expected yields, and place more importance on risk management. These factors may also be important for crop insurance and risk management in Canada.

However, producers in Canada may not have the same perceptions of a crop insurance program as producers in the United States. Crop coverage and policies can be different, such as a recent Canadian crop coverage plus option that allows producers who insure all their crops at the 80% level to receive 90% coverage if the calculated coverage level exceeds the 80% of probable yield covered (MASC 2006). As well, beliefs and values regarding risk and crop insurance maybe be different in Canada.

Data

A survey questionnaire was developed here for this study in 2007, for agricultural producers in Saskatchewan and Manitoba that produce grain. This survey was directed towards farmers in Western Canada in order to better understand their perception and preferences regarding crop insurance and risk management. A sample pre-test was conducted in a southern Manitoba region, after which the survey was revised. The revised survey was administered at a farm convention in Manitoba from which 71

surveys were gathered. The survey was then later administered at a farm convention in Saskatchewan, where an additional 222 completed surveys were collected for a total of 293 surveys.

The survey was designed so that all opinion questions were listed in a Likert scale fashion (1=strongly disagree, .. 5=strongly agree). All questions had a 5 point rating system, except when there were only two possible choices (gender, etc.). A reasonably broad geographic base was obtained from the sample, with farmers participating from much of Manitoba and Saskatchewan. The questionnaire included questions on pricing alternatives, knowledge and perception of risk management tools, strategies for dealing with risk, farm characteristics, farm management practices, and demographics.

Methodology

There is an order to the dependent variables from the survey (questions were on a 1-5 Likert scale rating), and therefore, an ordered probit method is used to estimate the model (Kennedy 2003). Probit regression can be employed as a preferred alternative to Ordinary Least Squares (OLS), when data is on a Likert scale.

There are several problems associated with using OLS as outlined by Gujarati (1999) when data is on a Likert scale or binary. The first problem with OLS when the data is binary is that the error term follows the binomial (probability) distribution, and this is an issue when the sample size is small, and there can be heteroskedasticity.

A second related problem with using OLS for Likert scale data is that the error term is generally heteroskedastic. A third problem is that an OLS estimation could give Y estimates beyond the Likert scale, e.g. $Y^* < 1$, and $Y^* > 5$ (Borooah 2001).

Ordinary least squares may also not be appropriate for Likert scale analysis because of the coding of the dependent variable. The OLS regression would not be able to fully distinguish the difference between scores 1 and 2 from the difference between scores 3 and 4. An ordered probit model is appropriate to make this distinction. Unlike other probit and logit models, the ordered probit model involves a qualitative dependent variable for which the categories have a natural order or ranking that reflects the magnitude of some underlying continuous variable/index (Becker and Kennedy, 1992). In an ordered probit model, the dependent variable is both discrete and ordinal.

The probit model can be defined as:

$$Yi^* = \beta' Xi = Ei \qquad [1]$$

Let i index respondent i, i= 1, ……, n, where n is the sample size. Let y_i be individual i's response to the survey question and assume that this can take one of the integer values 1, 2, 3, …. , J. Let $y_i^*(-\infty < y_i^* < +\infty)$ be the underlying latent variable representing producer i's propensity to agree with the statement advanced. Let x_i be a vector of characteristics relevant in explaining the attitude of a survey respondent. The ordered probit model is based on the assumption that y_i^* depends linearly on x_i, according to the following:

$$y_i^* = x_i \beta' + \mu_i, \text{ where } i = 1, \ldots, n; \qquad [2]$$
$$\mu_i \sim N(0,1)$$

The dependent variable question in this study has a 1-5 rating scale regarding positive or negative perceptions of crop insurance.

The β is a vector of parameters not containing an intercept. These parameters will ultimately be interpretable in the same way as slope parameters in linear regression. The perception that an agricultural producer has towards crop insurance is described by the relationship between y* and observed variable y is:

$$\begin{aligned} y &= 1 \text{ if } -\infty < y^* < \kappa_1 \\ y &= 2 \text{ if } \kappa_1 < y^* < \kappa_2 \\ y &= 3 \text{ if } \kappa_2 < y^* < \kappa_3 \\ &\vdots \\ y &= J \text{ if } \kappa_{J-1} < y^* < \infty \end{aligned} \qquad [3]$$

The parameters $\kappa_j, j = 1, \ldots, J\text{-}1$, are known as cut points or threshold parameters. They are estimated along with β, through maximum likelihood estimation.

The probit regression model can be viewed also as a special case of the generalized linear model whose link function is probit (Samuel, 2006). The probit model is used because there is an order to the dependent variable data, and the dependent variable is discrete, rather than continuous.

Results

The dependent variable in this analysis is agricultural producers' perception of crop insurance, with a scale of 1 to 5. 1= strongly disagree to 5 = strongly agree. Six independent variables were categorized into two different groups. The majority of the respondents indicated that they had purchased crop insurance the previous year (83%), as well that they farmed full time (83%), and there were 293 survey respondents.

Descriptive Results: Socio-Demographic

A descriptive analysis of selected variables shows the socio-demographic profile of the survey respondents. This information was separated into Saskatchewan and Manitoba, and results can be found in Table 2.1.

Approximately 55% of the farmers were between the ages of 40-54, 10% of the respondents were less than 25 years old (Figure 2.1). 66.6% of the respondents were married and about 85% live in a household with 2-5 people. The producers were very evenly dispersed around the number of years that they had farmed, around 20% for each category of years farming. Almost half of the respondents received education of a two year college degree or higher (45%), while 38.4% of the farmers received education at the grade 12 level (Figure 2.2). Of particular interest is that 62% of producers from Saskatchewan's education were at the grade 12 level or lower. In contrast, 56% of producers from Manitoba's education was higher than the grade 12 level. Only 12% of respondents had a farm size of less than 1000 acres, the most common farm size was 1751-2999 acres which had a percentage of 25.3% (Figure 2.3). Most of the income of the respondents was solely from the farm, as 42% of the respondents had an off-farm income of less than $10,000 over 5 years. On average the respondents centered around two net farm income brackets, $30,000-$50,000 (25%) and over $100,000 (27%) (Figure 2.4).

Descriptive Results: Contingency Table of Crop Insurance Perceptions with Selected Variables

Cross tabulations were conducted against the dependent variable, Perception of Crop Insurance, to understand the demographics of which agriculture producers perceive crop insurance more or less positively. The results can be found in Table 2.2 and are also further explained here.

Knowledge of Crop Insurance: Producers with a low knowledge level of crop insurance had a very negative perception of crop insurance (3.32%). Producers with higher knowledge of crop insurance had more positive perceptions of crop insurance (57% of respondents that said they had a 4 or 5 out of 5 level of knowledge of crop insurance had a positive perception of crop insurance).

Had Crop Insurance Last Year: Producers that did not have crop insurance the previous year had negative perceptions of crop insurance, while producers that previously had crop insurance had very positive perceptions of crop insurance (63% of respondents).

Age: Producers 40-69 years old seemed to have the most positive perceptions of crop insurance (44.82% of respondents). No age group, however, had an overwhelmingly positive or negative perception to crop insurance.

Number of Years Farming: This category was included to determine if age and experience had different results. However, the results were very similar to age. Those

that farmed in the middle category (15-29 years) had the most positive perceptions of crop insurance (24.81%).

Farm Size (Acres): Producers that farmed 1700-4999 acres had the most positive perceptions of crop insurance (36.53%). This category was interesting as it showed that producers with more than 5000 acres had the most negative perceptions to crop insurance.

Education Level: As was previously noted, 55% of respondents received only up to a grade 12 education level. This group of producers had the most negative perceptions of crop insurance for a total of 37.46%.

Farm Income (Net income averaged over the past five years): From the respondents in this survey, two farm income brackets showed more positive perceptions towards crop insurance. Producers that earned $30,000-$49,999 (18.9%) and those that earned $100,000 and above (19.29%). One would expect that those earning $100,000 and above would be the producers with a larger farmers, but it was previously noted that producers with largest farms had more negative perceptions of crop insurance.

Full Time versus Part Time Farming: Both producers that farm full time and those that farm part time appear to have positive perceptions toward crop insurance. 83% were full time farmers, and 17% were part time farmers.

Off-Farm Income: The sample for this survey consists mostly of producers that are farming full time (83% of respondents). Therefore, amount of off farm income is relatively low, often below $10,000. There are no clear trends outlining a particular income group to have a more positive or negative perception of crop insurance.

Descriptive Results: Probit Model Variables

The detailed definition of variables used for the probit model is shown in Table 2.3. The table reports the means of the variables by survey response. The variables are further described below.

Perception of Crop Insurance: This is the dependent variable in the probit analysis. The average response of agricultural producers surveyed was 3.05 (on a scale of 1-negative perception to 5-positive perception). Figure 2.5 shows the exact break down of responses. 27% of respondents provided the response of 4 out of 5.

Knowledge of Crop Insurance: This independent variable had an average response of 3.97 indicating that survey respondents had a fairly high level of knowledge of crop insurance. 1 represented a low level of knowledge of crop insurance, and 5 represented a high level of knowledge of crop insurance. Figure 2.6 breaks down survey responses, 71% of respondents chose either a 4 or 5 out of 5.

Speed of Crop Insurance at Paying Claims: The average response by agricultural producers was 3.05 and the variable is displayed graphically in Figure 2.7.

How Fair Crop Insurance Assess Claims: On average, producers chose 2.99 out of 5 when asked about how fair they feel their crop insurance claims are assessed (Figure 2.8) .

Bought Crop Insurance Last Year: Figure 2.9 outlines that 83% of producers bought crop insurance the previous year. The high participation rate could be impacting the knowledge level of producers. When they buy crop insurance, they may have at least some knowledge of the program.

Manitoba versus Saskatchewan: As shown in Figure 2.10, 41% of the producers are from Manitoba, while 59% are from Saskatchewan.

Level of Education: The average response to education level was 2.47. Figure 2.2 shows the exact break-down of the sample. 16% of respondents received less than grade 12, 38% received their high school diploma, 27% received a two year post-secondary diploma, and 18% of respondents received at least a four year university degree.

Perception of Crop Insurance- Ordered Probit Model Results

To determine agriculture producers' perceptions of crop insurance, an ordered probit model was estimated. As shown in Table 2.4, the dependent variable, perception of crop insurance, was used in the ordered probit model with a weighted least squares using a modified Gauss-Newton algorithm to compute the estimates.

The McFadden R^2 for the model is 0.175, which is considered an overall suitable fit for cross sectional survey data (Greene, 1997). Values between 0.2 and 0.4 are considered highly satisfactory.

Table 2.4 includes six variables of which four are significant. All coefficient signs are as expected. Three of the six variables are significant at the 1% level and one was significant at the 5% level. These variables are organized into two categories, crop insurance background, and demographics.

Crop Insurance Background. The positive coefficient of knowledge of crop insurance (0.118) indicates that when a producer has more knowledge of crop insurance, they will have a more positive perception of crop insurance. Speed of crop insurance at paying claims (0.345) and how fair crop insurance administrators assess producer claims (0.357) are both significant at the 1% level. Both coefficients are positive, which means they are associated with a more positive perception of crop insurance. If the crop insurance payment was timely and the producer feels that their field was fairly assessed for the correct damage level, they will have a more positive perception to crop insurance.

The coefficient of whether producers bought crop insurance last year (0.497) is positive and significant at the 5% level. This indicates that after purchasing crop insurance, producers are more satisfied with the experience and therefore have a more positive perception about crop insurance.

Demographics. The model shows statistically significant relations between whether a farmer is from Saskatchewan versus Manitoba and their crop insurance

purchase decisions. The probit model shows that farmers from Manitoba have a more positive perception of crop insurance (0.420) than those farmers from Saskatchewan. This variable is significant at the 5% level. Producers from Manitoba may have a more positive perception of crop insurance because the Manitoba program is well suited to producers needs, or demographics and production conditions could be relatively different between the two provinces.

As level of education (0.031) increases, so does the perception of crop insurance. This could be because as producers receive more education, they have the capacity to better understand and use crop insurance more wisely. However, this variable was not statistically significant.

Summary

Along with more risk management options, the choices for crop insurance available to agricultural producers have increased over the years. The objective of this study was to try to determine the factors affecting perceptions of crop insurance in Western Canada. Two variable groups were identified: crop insurance background, and demographics. Data was generated from a survey of agricultural producers in Saskatchewan and Manitoba, (Canada) and the model was estimated using the probit method. A sample size of 293 respondents was used for the study.

The two variable groups of crop insurance background and demographics showed statistically significant explanatory power. For the first group, crop insurance background, results indicated that when crop insurance adjustors fairly assess claims and pay producers quickly, producers will have a more positive perception of crop insurance.

Producers that had previously bought crop insurance were found to have a more positive perception of crop insurance. For the second group, demographics, results indicated that producers farming in Manitoba had a more positive perception of crop insurance than those in Saskatchewan.

The information from the study should help crop insurance firms to gain a better understanding of the factors shaping perceptions towards crop insurance. Such information may also be helpful for insurers to potentially increase the participation rates of agricultural producers who buy crop insurance, which in turn may reduce the cost of the insurance through reduced administration costs, and reduce the problem of adverse selection.

Table 2.1 Socio-Demographic Characteristics of Survey Respondents from Agricultural Producers Risk Management Survey

	Saskatchewan		Manitoba		Total	
	N	**%**	**N**	**%**	**N**	**%**
Marital Status						
Single	38	22.5	58	49.2	96	33.4
Married	131	77.5	60	50.8	191	66.6
Total	169		118		287	
Age						
Under 25 Years	10	5.9	21	17.8	31	10.8
25-39 years	24	14.2	23	19.5	47	16.4
40-54 years	41	24.3	39	33.1	80	27.9
55-69 years	55	32.5	24	20.3	79	27.5
70 years and older	39	23.1	11	9.3	50	17.4
Total	169		118		287	
Household Size						
One	19	11.2	12	10.4	31	10.9
Two	57	33.7	34	29.6	91	32.0
Three	37	21.9	34	29.6	71	25.0
Four-Five	47	27.8	32	27.8	79	27.8
Six or More	9	5.3	3	2.6	12	4.2
Total	169		115		284	
Education Level						
Less than grade 12	32	18.9	15	13	47	16.5
Grade 12	73	43.2	36	31.3	109	38.4
2 year college	42	24.9	35	30.4	77	27.1
4 Year University	21	12.4	28	24.3	49	17.3
> 4 year University	1	0.6	1	0.9	2	0.7
Total	169		115		284	
Farm Size (Acres)						
0-1000	21	13.3	13	11.3	34	12.5
1001-1750	29	18.4	26	22.6	55	20.1
1751-2999	43	27.2	26	22.6	69	25.3
3000-4999	28	17.7	35	30.4	63	23.1
5000+	37	23.4	15	13	52	19.0
Total	158		115		273	
Net Farm Income over past 5 years						
Less than $30,000	42	26.9	22	19.3	64	23.7
$30,000-$49,999	35	22.4	32	28.1	67	24.8
$50,000-$69,999	22	14.1	18	15.8	40	14.8
$70,000-$99,999	12	7.7	15	13.2	27	10.0
$100,000 or above	45	28.8	27	23.7	72	26.7
Total	156		114		270	

Figure 2.1 Average Age of Survey Respondents: Agricultural Producers Risk Management Survey

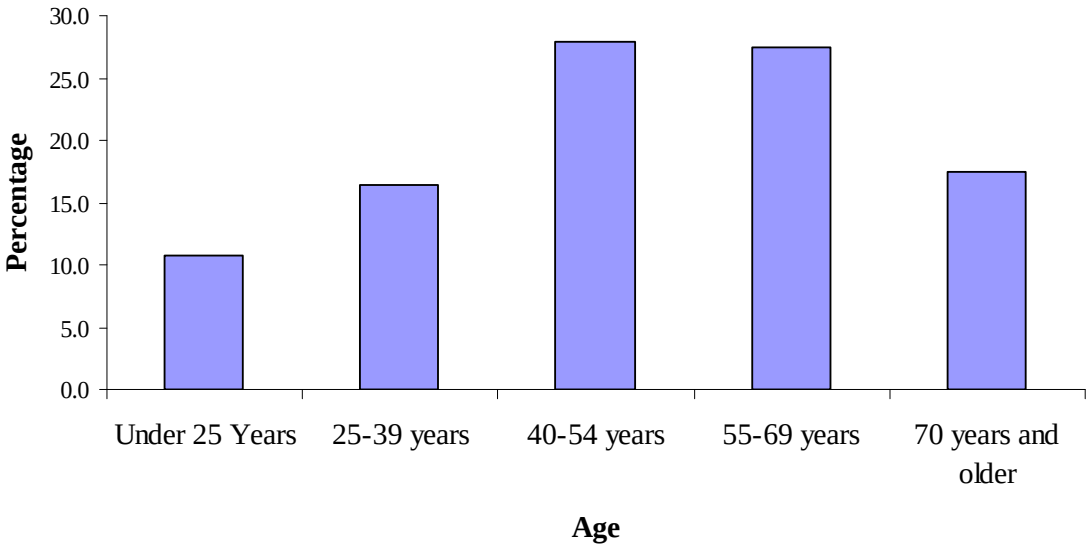

Figure 2.2 Education of Survey Respondents: Agricultural Producers Risk Management Survey

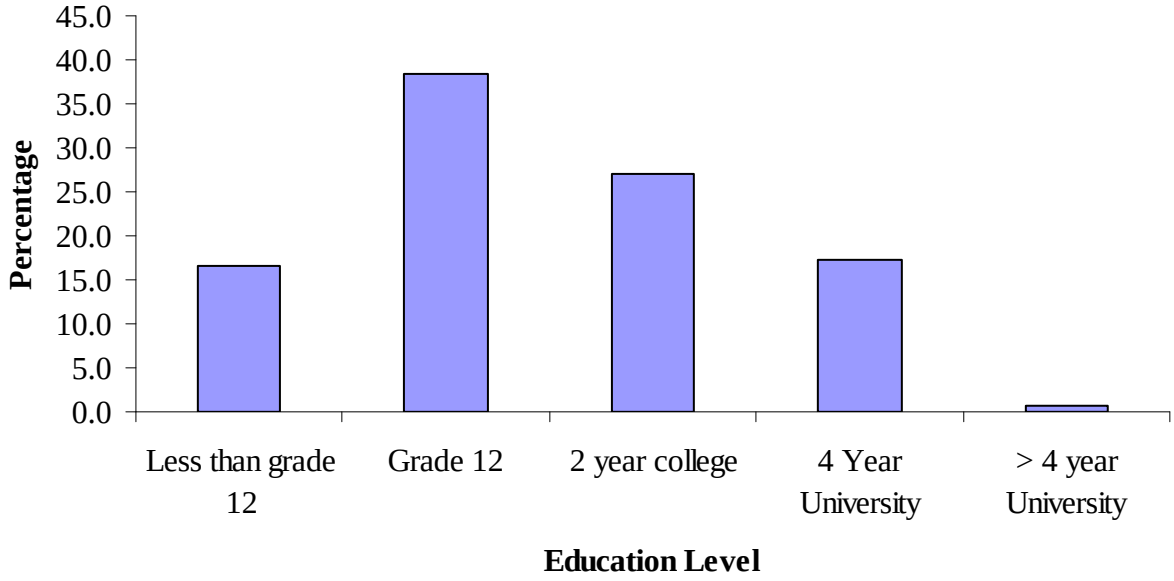

Figure 2.3 Farm Size of Survey Respondents: Agricultural Producers Risk Management Survey

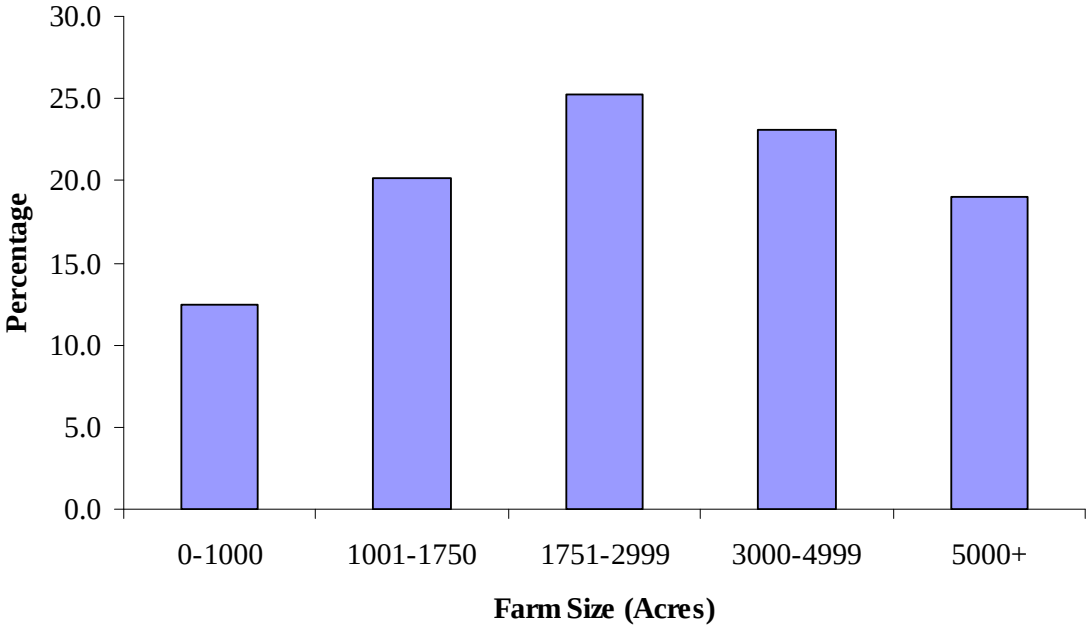

Figure 2.4 Net Farm Income of Survey Respondents: Agricultural Producers Risk Management Survey

Table 2.2 Contingency Table for Perception of Crop Insurance: Survey Respondents from Agricultural Producers Risk Management Survey

	Perception of Crop Insurance					
	Negative Perception			Positive	Perception	
Knowledge of Crop Insurance	1	2	3	4	5	Total (%)
1-Low Knowledge	3.32	0.00	0.37	0.00	0.00	3.69
2	0.74	1.11	2.21	1.11	0.00	5.17
3	3.32	3.69	4.43	2.58	0.37	14.39
4	5.54	6.64	11.07	18.08	2.95	44.28
5-High Knowledge	3.69	3.69	9.59	8.12	7.38	32.47
Total (%)	16.61	15.13	27.68	29.89	10.70	100.00
Have Crop Insurance Last year						
No	8.86	3.32	2.58	1.48	1.11	17.34
Yes	7.75	11.81	25.09	28.41	9.59	82.66
Total (%)	16.61	15.13	27.68	29.89	10.70	100.00
Age						
Under 25 Years	1.85	1.11	2.59	4.07	0.37	10.00
25-39 years	3.70	2.22	2.96	3.70	2.59	15.19
40-54 years	5.93	4.44	7.41	8.89	2.59	29.26
55-69 years	2.96	3.70	8.89	8.52	2.96	27.04
70 years and older	1.85	3.70	5.93	4.81	2.22	18.52
Total (%)	16.30	15.19	27.78	30.00	10.74	100.00
Years Farming						
Under 5 years	2.22	1.11	2.96	3.33	0.37	10.00
6-14 years	2.96	3.33	2.22	5.93	1.85	16.30
15-29 years	7.04	5.93	11.48	8.89	4.44	37.78
30-40 years	2.96	2.96	7.78	8.52	2.59	24.81
41 years +	1.11	1.85	3.33	3.33	1.48	11.11
Total (%)	16.30	15.19	27.78	30.00	10.74	100.00
Farm Size (Acres)						
0-1000	1.48	1.85	2.95	4.06	1.48	11.81
1001-1750	3.32	3.69	6.27	4.80	2.21	20.30
1751-2999	4.06	2.95	7.01	8.12	2.95	25.09
3000-4999	2.58	2.58	7.38	8.12	2.95	23.62
5000+	5.17	4.06	4.06	4.80	1.11	19.19
Total (%)	16.61	15.13	27.68	29.89	10.70	100.00

Table 2.2 Continued Contingency Table for Perception of Crop Insurance: Survey Respondents from Agricultural Producers Risk Management Survey

	Perception of Crop Insurance					
	Negative Perception			Positive	Perception	
Education Level	1	2	3	4	5	Total (%)
Less than grade 12	3.00	2.25	6.74	5.24	0.75	17.98
Grade 12	6.37	8.24	10.86	7.49	5.24	38.20
2 year college	4.87	3.00	5.24	9.74	2.25	25.09
4 Year University	1.87	1.87	4.87	7.49	1.87	17.98
> 4 year University	0.37	0.00	0.37	0.00	0.00	0.75
Total (%)	16.48	15.36	28.09	29.96	10.11	100.00
Farm Income						
Less than $30,000	5.12	4.33	5.51	3.94	3.54	22.44
$30,000-$49,999	2.36	4.33	7.87	9.06	1.97	25.59
$50,000-$69,999	2.36	1.97	3.94	4.72	1.57	14.57
$70,000-$99,999	1.57	0.39	1.57	4.72	1.18	9.45
$100,000 or above	5.12	3.54	9.06	7.87	2.36	27.95
Total (%)	16.54	14.57	27.95	30.31	10.63	100.00
Full Time versus Part Time Farming						
Part	2.24	1.87	4.10	6.34	0.37	14.93
Full	14.55	13.43	23.88	23.51	9.70	85.07
Total (%)	16.79	15.30	27.99	29.85	10.07	100.00
Off-Farm Income						
Less than $10,000	8.98	6.25	11.33	13.28	4.30	44.14
$10,000-$19,999	3.91	1.17	5.47	4.30	1.56	16.41
$20,000-$29,999	1.95	3.13	5.47	3.91	2.34	16.80
$30,000-$39,999	0.39	0.78	1.56	2.34	1.17	6.25
$40,000 and above	1.17	3.13	4.30	6.64	1.17	16.41
Total (%)	16.41	14.45	28.13	30.47	10.55	100.00

Table 2.3 Description of Variables and Survey Response Scores for Probit Model for Perceptions of Crop Insurance of Agricultural Producers (N=293)

Variable Names	Mean Survey Response (N=293)	Description of Variables
Dependent Variable		
Perception of Crop Insurance	3.03	1 = very unfavorable,…, 5 = very favorable
Independent Variables		
Crop Insurance Background		
Knowledge of crop insurance	3.97	1 = low knowledge,…, 5 = high knowledge
Speed at paying claims	3.05	1 = very slow,…, 5 = very fast
Fair claims assessment	2.99	1 = very unfair,…,5 = very fair
Bought crop insurance last year	0.83	1 = yes, 0 = no
Demographics		
Manitoba vs. Saskatchewan†	0.41	1 = Manitoba, 0 = Saskatchewan
Education	2.47	1 = <grade 12, 2 = grade 12, 3 = college/diploma, 4 = university degree, 5 = masters or higher

Note: "†" denote for variables with binary scale, other variables are on 1 to 5-point Likert scale.
Note: Missing observations were handled through SPSS missing data procedure

Figure 2.5 Dependent Variable, Perception of Crop Insurance, for Agricultural Producers Risk Management Survey

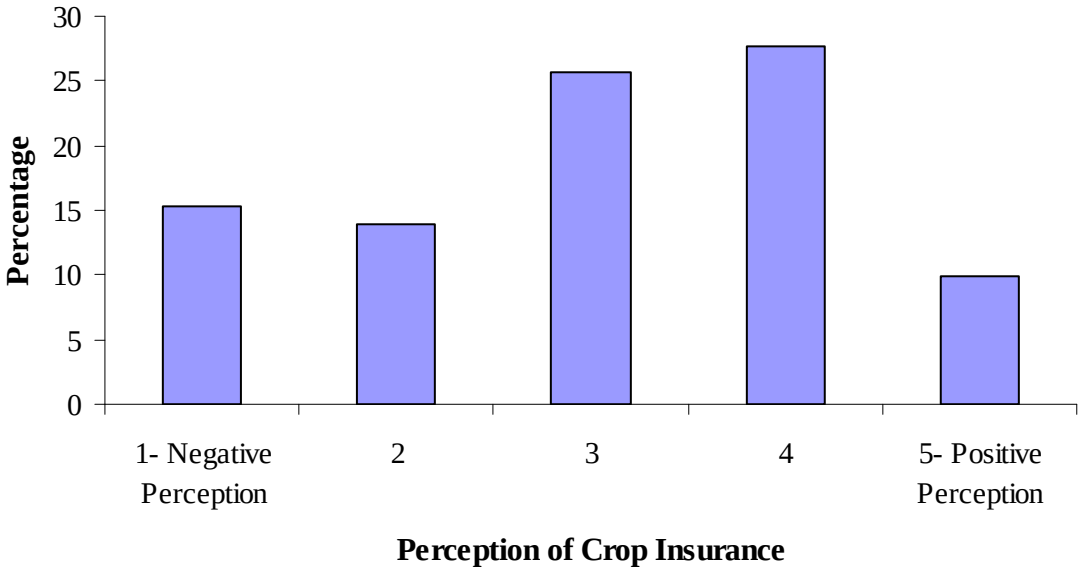

Figure 2.6 Knowledge of Crop Insurance, Independent Variable, from Agricultural Producers Risk Management Survey

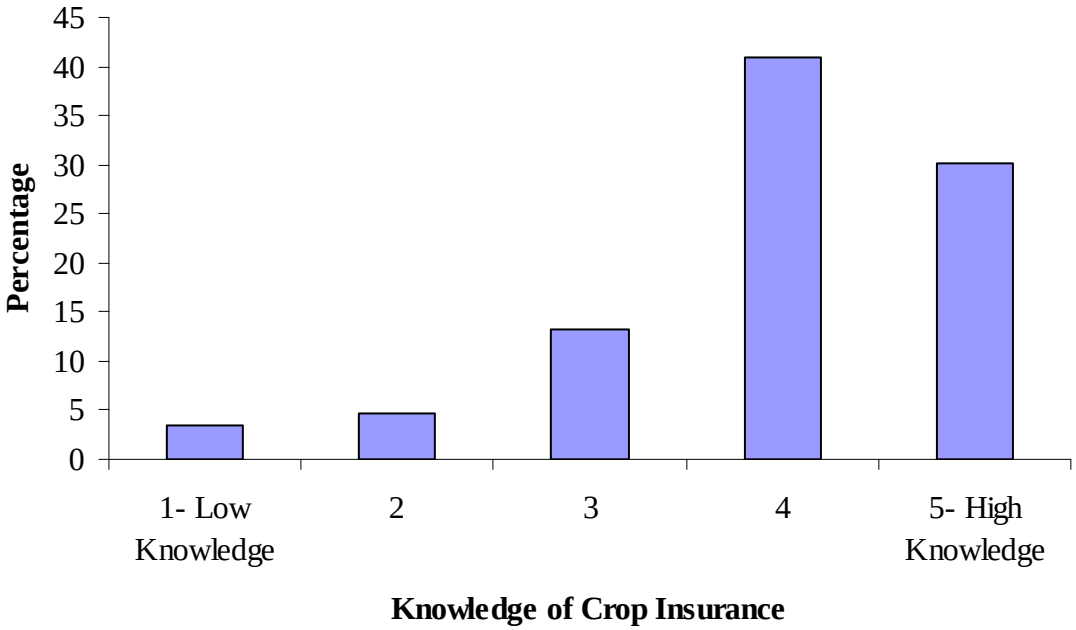

Figure 2.7 Speed of Crop Insurance at Paying Claims, Independent Variable, from Agricultural Producers Risk Management Survey

Figure 2.8 How Fair Crop Insurance Assess Claims, Independent Variable, from Agricultural Producers Risk Management Survey

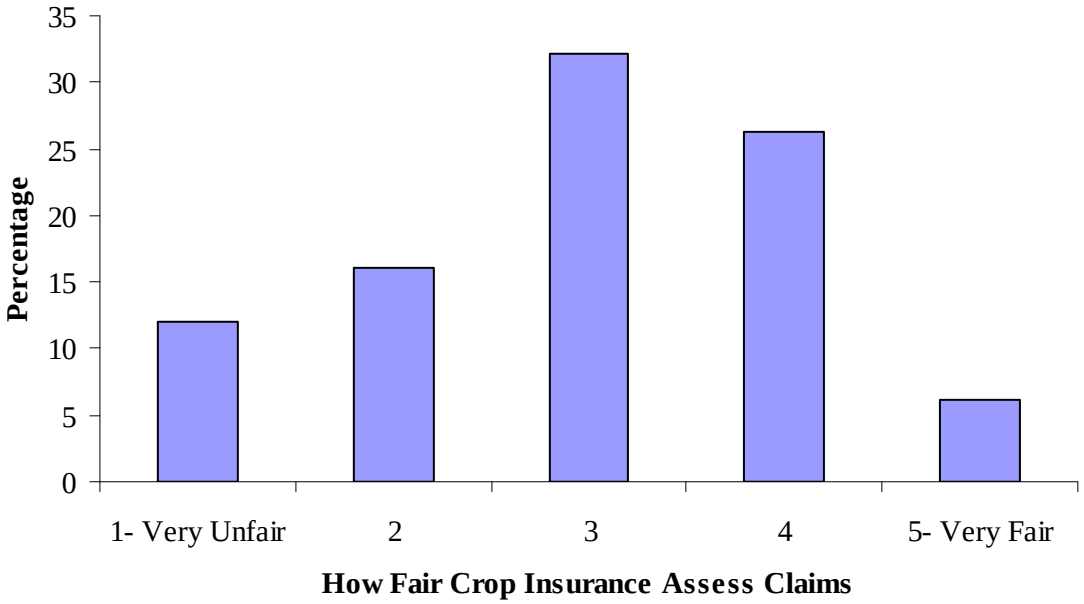

Figure 2.9 Have Crop Insurance Last Year, Independent Variable, from Agricultural Producers Risk Management Survey

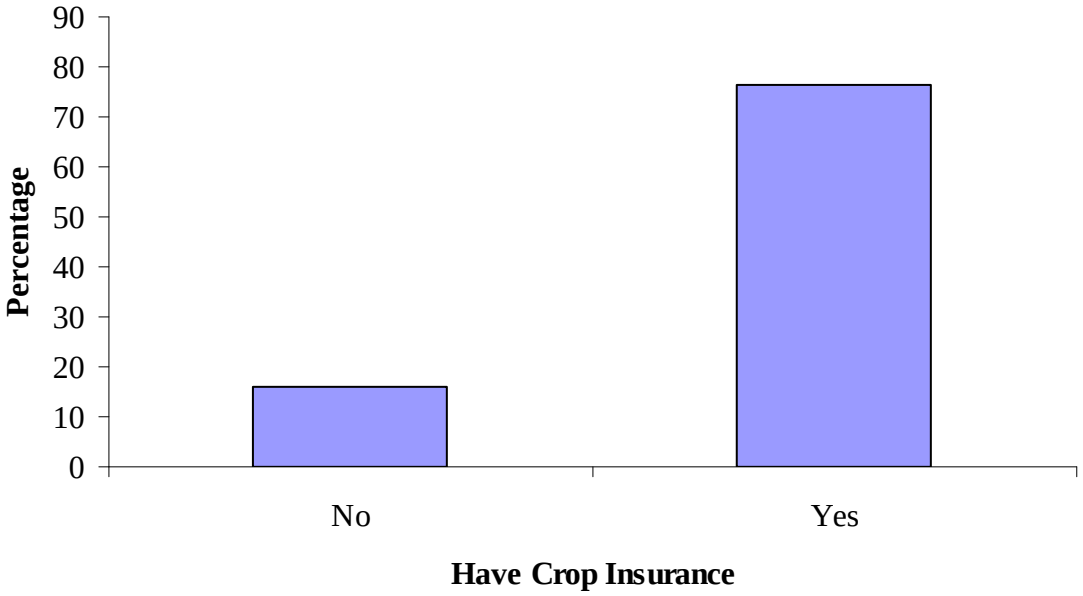

Figure 2.10 Farm in Saskatchewan or Manitoba, Independent Variable, from Agricultural Producers Risk Management Survey

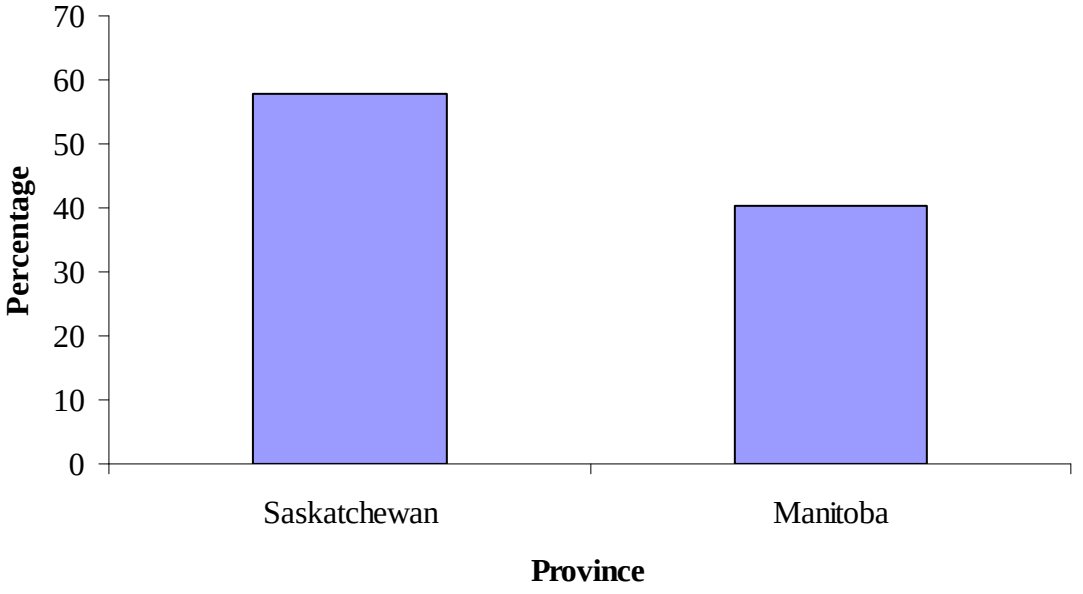

Table 2.4 Perception of Crop Insurance by Agricultural Producers: Estimates of the Ordered Probit Model (N=293)

Parameters	Estimated Coefficient	Standard Error of Coefficient
Crop Insurance Background		
Knowledge of crop insurance (CI)	0.118	0.077
Speed at paying claims	0.345***	0.079
Fair claims assessment	0.357***	0.081
Bought crop insurance (CI) last year	0.497**	0.198
Demographics		
Manitoba vs. Saskatchewan†	0.420***	0.142
Education	0.031	0.068
Pseudo R-Square		
Cox and Snell	0.416	
Nagelkerke	0.436	
McFadden	0.175	

Note:
*** indicates significance at 1% level
** indicates significance at 5% level
* indicates significance at 10% level
Note: "†" denotes variables with binary scale, other variables are on 1 to 5 point Likert scale.

Note: Missing observations were handled through SPSS missing data procedure

CHAPTER 3

FREQUENCY OF HEDGING WITH THE FUTURES MARKETS BY AGRICULTURAL PRODUCERS

Introduction

There are numerous risks associated with agricultural production, and the previous chapter explored perceptions of crop insurance. This chapter focuses on price risk, and agricultural producers often attempt to manage price risk in a variety of ways, such as lowering debt, diversifying, using government programs, forward contracts, hedging with futures, or hedging with options.

Previous studies have explored the underlying reasons regarding why producers choose a particular method to manage their price risk over others, but these responses are not completely understood, especially regarding hedging with futures (Tomek and Peterson, 2001; Pannell et al., 2008). Therefore, there is a need for more research on hedging by commodity producers in a broader risk management context (Carter, 1999).

A number of hedging models often prescribe some level of expected producer hedging (Johnson, 1960; McKinnon, 1967; Telser, 1955). The rationale for hedging has often focused primarily on a few factors such as output price volatility, risk aversion, and basis risk (Frechette, 2000).

Therefore, the purpose of this paper is to better understand the factors related to futures hedging in Western Canada. This study should be useful to Canadian risk management firms, policy makers, and governments, as relatively few studies such as this have been conducted in Western Canada. Such studies should be of particular interest to agricultural policy makers, who design and implement income stabilization policies for

agricultural producers, as well as brokers, commercial buyers, financial institutions, and regulators. The study outline is as follows, the next sections focus on hedging background, a literature review, data, methodology, results, and concluding with a summary of the paper.

Hedging Background

Worldwide, futures trading has grown by 110% from 2003 to 2007, and agricultural commodities were the third largest trading group and they increased from around 489M contracts in 2006 to 646M contracts in 2007, for a 32% increase in volume (Burghardt, 2008). The motivations behind why producers use futures markets as an effective tool to hedge price risk includes numerous studies on applied and theoretical models (Carter, 1999; Garcia and Leuthold, 2004; Tomek and Peterson, 2001). The USDA has recommended producers to lock in prices (hedge) between 30 and 50 percent of expected production (Grant, 1989). However, Brorsen and Fofana (2001), and Goodwin and Schroeder (1994) suggest that U.S. grain producers do not hedge a large amount of their crops.

For this paper, a working definition of hedging can be used, of using futures to effectively lock in a price for some portion of the producers' expected crop production through equal and offsetting cash and futures positions. Besides using futures for hedging, other price risk management practices such as using forward contracts or options can also be used, which may serve as complements to futures. Some other variables that may influence the use of futures hedging include, price regulation, government programs/subsidies, output price volatility, foreign exchange volatility, basis

risk, transaction/margin costs, input price volatility, natural hedges, size of operation, farm leverage (debt), producer portfolio diversification, level of risk aversion, education level, (Castelino,1992; Kahl 1983; Lapan and Moschini, 1994; Peck, 1975; Turvey and Baker, 1989). Some of these variables which may influence futures hedging are described in more detail below and have been broken into four categories: *Risk Behavior, Knowledge and Attitudes, Farm Characteristics, and Demographics.*

Past Literature

Risk Behavior Group of Variables

Producers may make pricing decisions (whether or not to take a position in the futures market) prior to planting their crop in the spring. This decision can be revised at any period throughout the cropping season, which is why Stulz (1984) and Karp (1988) point out that hedging decisions of commodity producers are best viewed within a dynamic, rather than static, framework. The producer must take both price risk uncertainty and quantity uncertainty into account when making hedging decisions. Because of the numerous risks associated with agriculture (weather, pests, disease, etc.) futures hedging may be less able to provide a reliable hedge, particularly in the case of production failure (Lapan and Moschini, 1995). Because of this, some literature suggests that crop insurance be coupled with futures hedging to reduce risk. Other variables explained below included price regulation, government programs, forward contracts and options.

Price Deregulation: Some agricultural markets and prices have been becoming more deregulated over the past couple of decades, and likely fewer marketing boards, fewer price supports, and more free trade exists. This may have created more price volatility and in turn created a greater need for price risk management than with more regulated markets. Because of deregulation, instruments such as futures have been introduced, thereby resulting in increasing futures trading volumes. As previously stated, the volume of agricultural contracts increased 32% from 2006 to 2007.

Government Programs: Governments have provided subsidies in the past to the agriculture sector in an effort to stabilize income for producers. This may reduce business risk and therefore reduce the need for hedging. In Canada agricultural producers have had subsidized programs based on both gross and net income stabilization. The costs associated with crop insurance are also subsidized (as explored in Chapter 2). Mahul (2003) argued that crop insurance could serve as an example of a government support program that acts as a complement rather than a substitute to hedging with futures.

Forward Contracts: In agricultural production, producers are often more familiar with forward contracts than futures contracts for hedging. Nelson (1985) states "Many farmers clearly view forward and futures as distinct marketing options, since they evidently prefer the former". Nelson lists three differences between futures and forward contracts: 1) forward contracts are contracted at any quantity whereas futures are contracted only at standardized quantities, 2) forward contracts are settled only at

maturity whereas futures require daily mark to market margining, and 3) forward contracts can be structured without basis risk whereas futures always involve some basis risk to the producers.

For these reasons, producers often prefer forward contracts over futures, likely resulting in less futures hedging. On the other hand, a forward contract requires an organized relationship between the buyer and seller whereas a futures market provides an organized market to facilitate trade with strangers (Telser, 1981). The counterparty risk is reduced through futures trading and a clearing house ensures funds are collected. When forward contracts are used to make a sale with delivery at a future date, the buyer of the commodity could use the futures market to "sell" the commodity and hedge the price risk, which could result in additional futures trading volume.

Options: Options may be seen as a complement to futures hedging, as a producer may use options, as well as futures, for hedging. An option on futures gives the right, but not the obligation, to buy or sell futures. Hull (2005) explains "A put option allows a commodity producer to pay a premium to obtain a price floor if the price drops, while receiving the higher price if the price rises." Producers must pay a premium to use options, which is different than the margins associated with futures.

Output Price Volatility: In agriculture, output price risk is associated with structural economic factors such as inelastic supply and demand, as well as random shocks such as severe weather (Tomek and Robinson, 2003). The threat of volatile output prices, and low prices, could lead to increased use of hedging by agricultural producers to counter

the effects of output price volatility. This implies that producers are more inclined to hedge if they face higher price variation either directly or indirectly (Brorsen and Fofana, 2001; Kaastra and Boyd, 1995).

Input Price Volatility: Input price volatility is expected to be positively related to hedging, for agricultural producers. When there is high price volatility for inputs related to agriculture, such as fertilizer or fuel, producers could use futures to hedge that price risk. This way if the price of fertilizer increases substantially, producers will not feel the effect as producers that did not hedge against that price increase. Koppenhaver and Swidler (1996) support this hypothesis. They argue choosing the input quantity level and futures position to maximize expected end of period wealth is one of the main objectives of risk management. The implication is that as input prices become more volatile, producers will increase hedging with futures.

Natural Hedges: A natural hedge can occur when a rise in production quantity is offset by a drop in price, or vice-versa., and revenue is stabilized (McKinnon, 1967). In agricultural production an example of this would be if there was favorable weather, causing production to increase, therefore reducing the price of commodities. It is hypothesized that natural hedges can result in less need for hedging. Brown and Toft (2002) state p. 1285, "…when prices are negatively correlated with produced quantity, the firm should typically hedge less…"

Foreign Currency Volatility: As exchange rates become more volatile, more agricultural producers may hedge their exchange rate risk. When surveying agricultural producers for this study, one of the frustrations for Canadian producers is foreign currency volatility. With the close proximity to the U.S market, many producers rely on their U.S. counterparts for export sales of their commodities. Broll and Wahl (1996) state "Firms engaged in international operations are highly interested in developing ways to protect themselves against exchange rate risk. The incentive for risk management comes from the enormous volatility of the floating foreign exchange rates".

Basis Risk: Basis is defined as the difference between the cash price and the futures price. When the basis is unstable it can reduce the effectiveness of hedging and therefore deter the use of futures for hedging. Basis for commodities generally reflects the transportation and carrying charges (Paroush and Wolf, 1989) and can be influenced by regional supply and demand factors. Working (1953) and Johnston (1960) argue that a reasonably predictable basis is a necessary condition for effective hedging, so that futures gains will offset cash losses.

Producer Portfolio Diversification: If an agricultural business is highly diversified across crops, livestock, inputs, geographic location, it is less likely to use futures for hedging. Koppenhaver and Widler (1996) suggest that diversification can allow producers to reduce business risks on their own, rather than hedging to reduce risk. On the other hand, if the producer is not diversified, Koppenhaver and Widler (1996) suggest that there may be a greater need for hedging price risk with the futures market.

Level of Risk Aversion: As an agricultural producer's level of risk aversion increases they are more likely to hedge to stabilize their income. Producers' risk attitudes may also influence their adoption of risk management practices. This is recognized by Harwood et al. (1999), Penning and Garcia (2001) and Pennings and Smidts (2000). Producers with higher levels of risk aversion are likely more willing to pay greater risk premiums to hedge and have stronger interest in hedging (Baron, 1979).

Knowledge and Attitudes Group of Variables

Knowledge of Futures and Options: When an agricultural producer has a higher level of knowledge of different risk management alternatives, such as futures and options, they may be more likely to hedge with futures markets.

Transaction and Margin Costs: Futures transaction costs include brokerage fees or commissions associated with futures. Bond and Thompson (1985) and Pannell et al. (2008) state that higher hedging transaction costs, as well as liquidity costs, may reduce the use of hedging by producers. When less competitive prices are obtained by hedgers, liquidity costs can occur. The producers who use futures markets to hedge must bear these costs (Hirshleifer, 1988). When there is low participation in futures markets (low volume, number of participants) the liquidity costs will be higher, increasing brokerage fees and therefore lowering the number of producers using futures for hedging due to the high costs. Margin costs are the funds required by futures exchanges in order to eliminate counterparty risk and contract default with futures. Higher margin costs are

also expected to lead to less hedging by agricultural producers. During times of high fluctuation in the market there will be increased margin calls requiring producers to provide payments to the future contract holder due to "mark-to-market" requirements (Anderson and Danthine, 1983).

Farm Characteristics Group of Variables

Size of Operation: As the size of an agricultural business operation increases, it is hypothesized that hedging may increase. Mian (1996) states p. 419, "…evidence uniformly supports the hypothesis that hedging activities exhibit economies of scale." Shapiro and Brorsen (1988) also found that business operation size was related to hedging. As an agricultural business grows, they will have more resources to hire external specialists that could employ hedging techniques to manage the larger price risk, and therefore could hedge more easily.

Farm Leverage (debt): The literature suggests two opposing arguments for the influence of debt level on hedging practices. Turvey and Baker (1990) observe p. 947, "…hedging may partially substitute for other forms of liquidity such as credit reserves," indicating a negative relationship between hedging and debt because hedging may reduce price risk and reduce the need for debt. However, an opposing view is that a positive relationship between hedging and debt could occur if agricultural producers use futures to hedge output price as a form of collateral (Heifner, 1972). If the producer has more funds to meet margin calls for futures, the probability that they will hedge increases. Turvey and

Baker (1990) state that "..high debt farms will hedge more than low debt farms…" Shapiro and Brorsen (1988) found that higher farm debt levels were associated with higher levels of hedging by producers.

Demographics Group of Variables

Education Level: Makus et al. (1990) found that those who had obtained a college degree were more likely to hedge. Pennings and Garcia (2004) also hypothesized that level of education would be positively related to the manager's use of derivatives. When a producer receives a higher level of education, they will have a deeper understanding of the mechanics behind derivatives after studying the requirements for successful hedging. As hedging is a complex matter, those that do not have post secondary education may find it too difficult to learn the necessary methods for hedging with futures.

Data and Methodology

The same survey data explained in Chapter 2 are used for Chapter 3. Probit analysis is applied to identify the factors regarding the frequency by which agricultural producers use the futures market to hedge price risk.

Results

The dependent variable of interest in this analysis is the agricultural producers' frequency of using the futures market to hedge their price risk with a scale of 1= never, to

5 = very often. Thirteen independent variables were categorized into four different groups. These groups are risk behavior, knowledge and attitudes, farm characteristics and demographics, and 293 observations were used (N=293).

Descriptive Results: Socio Demographic

Please refer to Chapter 2 for the descriptive analysis of selected socio-demographic variables of the survey respondents (Table 2.1).

Descriptive Results: Contingency Table of Hedging with Futures and Selected Variables

Cross tabulations were conducted against the dependent variable, Frequency of Hedging with Futures, to understand the demographic profile of agricultural producers using futures to hedge. The results can be found in Table 3.1 and are further explained below.

Knowledge of Futures and Options: Producers with a low knowledge level of futures and options indicated that they never or rarely hedge with futures (29.7%). Those with higher levels of knowledge indicated that they use futures average or often to hedge price risk with futures (32%).

Age: Most producers 55 years or older indicated that they never or rarely use futures to hedge price risk (28%). Producers 40-54 years old use futures the most to hedge their price risk (17%).

Years Farming: Most producers indicated they have farmed for 15-29 years. There was roughly an even distribution across how frequently these producers hedged their price risk with futures. Producers farming for over 30 years had a high percentage in the 'never' and 'rarely' categories of using futures for hedging (22%).

Farm Size (Acres): This variable category provided very interesting results, as producers who indicated they had farming operations of less than 3000 acres, 'never' or 'rarely' used futures to hedge price risk (36%). On the other hand, 30% of producers with farms over 3000 acres indicated they used futures 'often' or 'very often' to hedge price risk.

Educational Level: As discussed in Chapter 2, 55% of sample respondents received up to grade 12 education. 45% of producers that received up to a 2 year college diploma indicated that they 'never' or 'rarely' use futures to hedge their price risk. This could be because they have not taken courses on how futures exchanges work. This could also be correlated with the group that has a low knowledge level of futures or options.

Farm Income: 9.45% of producers with less than $30,000 net income indicated they never use futures for hedging. 15% of producers with more than $100,000 net income indicated they use futures an average amount to hedge price risk.

Full Time versus Part Time Farming: Producers farming part time use futures less frequently (7.24%) than those farming full time (49%) to hedge price risk.

Off-Farm Income: 33% of producers making less than $10,000 indicated they hardly use futures markets for hedging (response of 'average' use and less). 12% of producers with an off-farm income of over $40,000 indicated they use futures to hedge price risk (more than 'average' frequency).

Descriptive Results: Contingency Table of Hedging with Forward Contracts and Selected Variables

Cross tabulations were conducted against the independent variable, Frequency of Hedging with Forward Contracts, to understand the demographic profile of agricultural producers using forward contracts to hedge. The results can be found in Table 3.2 and some key findings are highlighted below.

Knowledge of Futures and Options: The results here are consistent with how producers use futures to hedge. Those that have a low knowledge level of futures and options are less likely to use forward contacts to hedge (26%), and those with higher knowledge use forward contracts more frequently (38%)

Farm Size (Acres): Farmers with over 3000 acres indicated that they use forward contracts more often for hedging their price risk (35%). These results are similar to those that use futures for hedging.

Farm Income: Producers that make less than $50,000 indicated a low use of forward contracts to hedge price risk (24%). Those that make more than $100,000, however, indicated they use forward contracts more frequently (19%).

Descriptive Results: Contingency Table of Hedging with Options and Selected Variables

Cross tabulations were conducted against the independent variable, Frequency of Hedging with Options, to understand the demographic profile of agricultural producers using options to hedge. The results can be found in Table 3.3 and some key findings are highlighted below.

Knowledge of Futures and Options: Producers that indicated they have a low knowledge level of futures and options indicated they never use options to hedge price risk (33%). This high percentage is reflective of the fact that 40% of respondents have never used options to hedge price risk.

Age: 30% of sample respondents over 40 years old indicated that they have never used options to hedge price risk.

Educational Level: Producers with a 2 year college degree or less indicated they hardly ever use options (73%). It was not easy to identify which education level uses options most frequently to hedge price risk.

Farm Income: 33% of respondents making less than $50,000 indicated they 'never' or 'rarely' use options to hedge their price risk. This is consistent with those using futures and forward contracts for hedging. One key difference was that producers making more than $100,000 do not have a tendency to hedge more frequently with options (only 11%), whereas they did with futures (15%) and forward contracts (19%).

Descriptive Results: Probit Model Variables

The definition of variables used for the probit model is shown in Table 3.4. The table reports the means of the variables by survey response with the dependent variable of Frequency of Hedging with Futures. The variables are further described below.

Frequency of Hedging with Futures: As stated above, the dependent variable, Frequency of Hedging with Futures, asked producers to rate how often they use futures on a scale of 1-5. After further breaking this information down into two variable groups of 'never hedging' and 'some experience hedging' it was interesting to note that 73% of the sample have tried using futures to hedge their price risk. 27% indicated they have never used futures, 24% indicated they rarely use futures, 24% use futures an average amount, 21% use them often, while only 5% use futures for hedging very often.

Results from the contingency tables offer some explanation for this high percentage of producers trying futures. A number of the producers in the survey have large farms, and farm incomes of over $100,000. These producers had a higher frequency of using futures for hedging. Producers in the age categories from 25-69 years old hedged more frequently than the rest of the sample, especially the age category 40-54 years. While 73% of the sample indicated they have used futures for hedging, 51% of the sample indicated they rarely or never used futures. This is evident in the contingency tables as the highest percentages are located in the 'never' and 'rarely' columns of Table 3.1

Frequency of Hedging with Forward Contracts: Table 3.4 describes this independent variable in the probit model, the average response is 2.82. As shown in Figure 3.2, 51% of respondents indicated they use forward contracts, average or often.
From the contingency table (Table 3.2) it appears that the same group using futures for hedging are using forward contracts for hedging. Producers with large farm operations, high net income and those that have been farming for at least 15 years have higher frequencies of using forward contracts to hedge price risk.

Frequency of Hedging with Options: 40% of sample respondents indicated that they have never tried using options for hedging. The average response was 2.08. 33% of respondents indicated that they use options on an 'average' to 'very often' frequency (Figure 3.3). The contingency table for hedging with options (Table 3.3) indicates the

highest percentages of producers using options for hedging have large farms, high net incomes and have been farming for 15-29 years.

Frequency of Speculating with Futures: Producers indicated that they are using the futures market for speculation purposes more than using options for hedging. The average response was 2.22, although 28% of producers indicated they never use the futures market for speculation (Figure 3.4).

Knowledge of Futures and Options: The average response for this independent variable was 2.81. Figure 3.5 shows these results graphically.

Level of Trust in Futures Brokers: The question in the survey for this independent variable was worded "How much do you trust futures and options brokers and exchanges?" The average response on the 5 point scale was 2.58, indicating that producers still do not have a high level of trust in futures brokers and exchanges. A break down of this variable is located in Figure 3.6.

Importance of Low Brokerage Fees: This independent variable ranked important to producers, with an average of 3.21. Figure 3.7 indicates that 22% of the sample gave this a high importance score of 5 out of 5.

Debt Level: Producers have an average level of debt on their farm operations, 3.02. They were asked to list their debt level in comparison to their neighbors (Figure 3.8).

Farm Size: This sample appears to have larger farm operations. 18.4% of respondents indicated they have more than 5000 acres, while 46% have 1751-5000 acres (Figure 2.3). As indicated in the contingency tables, producers with larger farms appear to hedge their price risk more frequently with futures, options and forward contracts.

Fertilizer Use: A very high percentage of producers use fertilizer, with an average of 3.77. Figure 3.10 indicates that 65% of respondents gave this a score of 4 or 5 out of 5 when asked to state their fertilizer use level.

Zero Tillage: The average response for using zero tillage was 3.19, as indicated in Table 3.4. Further exploration of this independent variable in Figure 3.11 indicates an interesting break down of the sample. 25% indicated that they never use zero tillage in their production practices, while 31% indicated they have a high use level. For a farm operation to become zero tillage it may take a long term commitment from the producer.

Age: As shown in Figure 2.1, 28% of the sample are 40-54 years old. This age group seems to use futures, forward contracts and options the most frequently to hedge their price risk as indicated in the Contingency Tables (Tables 3.1, 3.2, 3.3).

Manitoba versus Saskatchewan: As shown in Figure 2.10, 41% of the producers in the survey are from Manitoba, while 59% are from Saskatchewan.

Net Farm Income: 24% of respondents have a net income of $30,000-$49,999 while 25% have an income of more than $100,000. This is shown in Figure 2.4. The average response was 2.92.

Hedging Frequency with Futures- Ordered Probit Model Results

To determine agricultural producers' frequency of hedging price risk with futures, an ordered probit model was estimated. As shown in Table 3.5 the dependent variable, frequency of hedging with futures, was used in the ordered probit model with a weighted least squares using a modified Gauss-Newton algorithm to compute the estimates.

The McFadden R^2 for the model is 0.334, which is considered a highly satisfactory fit for cross sectional survey data (Greene, 1997). Values between 0.2 and 0.4 are considered highly satisfactory.

Table 3.5 includes four variable categories, and thirteen variables of which six are significant. All coefficient signs are as expected. Three of the thirteen variables are significant at the 1% level, two are significant at the 5% level and one is significant at the 10% level. These variables are organized into four categories: risk behavior, knowledge and attitudes, farm characteristics, and demographics.

Risk Behavior. All three variables for risk behavior were found to be significant at the 1% level. The positive coefficient of hedging with forward contracts (0.305) indicates that when a producer hedges their price risk with forward contracts, they will have a higher frequency of hedging their price risk with futures. Frequency of hedging

with options (0.453) is also positive, indicating that as producers increase hedging practices with options, they will in turn increase hedging practices with futures. Some literature suggests that these could be substitutes for hedging with futures (Nelson, 1985), however, results here indicate that the three behave more as complements.

With the large size of farming operations, producers are often contracting external support to sell their crops. These experts often employ numerous types of price risk management practices including all of the above three mentioned choices. Musser et al. (1996) report from their survey of large scale agricultural producers that 53% use futures for hedging, 34% use options and 59% use forward contracts. These percentages are consistent with this study.

The positive coefficient of speculating with futures (0.492) indicates that as producers increase the frequency by which they speculate with futures, there is a strong relationship indicating they will increase the frequency by which they hedge price risk with futures.

Knowledge and Attitudes. The positive coefficient of knowledge of futures and options (0.053) indicates that as producers have more knowledge about futures and options, they will hedge more frequently. This variable is not significant though, so the relationship is not as strong. The same holds for level of trust in futures brokers and exchanges. The positive coefficient (0.107) is not significant, but implies that the more trust a producer has in futures brokers, the more likely they are to increase their hedging practices with futures. Importance of low brokerage fees has a positive coefficient

(0.138) and is significant at the 5% level. As the brokerage cost to purchase futures goes down, agricultural producers are more likely to hedge their price risk with futures.

Farm Characteristics. The positive coefficient of debt level (0.044) indicates that as producers' debt level increases, they are more likely to hedge their price risk with futures. As a producer enters higher into debt, their risk increases, and to reduce this risk they may hedge with futures. However, this variable was not significant in this analysis.

Farm size showed a positive coefficient (0.156) and is statistically significant at the 10% level. As farm size increases, producers are more likely to hedge their price risk with futures.

Both the variables of fertilizer use (0.014) and zero tillage (0.037) showed positive coefficients. However, these variables were not found to be statistically significant. Results indicate that as producers increase the application of fertilizer, zero tillage, or farm size, they are more likely to hedge risk with futures.

Demographics. Age showed a negative coefficient (-0.062) indicating that as a producer becomes older, they will be less likely to use the futures market to hedge their price risk. This was also highlighted in the contingency table (Table 3.1). The variable, however, was not found to be statistically significant, therefore, it is uncertain as to how much explanatory power that age has on hedging practices.

Whether the producer farms in Manitoba or Saskatchewan (0.413) is statistically significant at the 5% level. This implies that producers in Manitoba hedge more than those from Saskatchewan, and may reflect that producers from Manitoba have different

farm characteristics or demographic characteristics than those from Saskatchewan, which in turn impact the use of hedging. Farm income (0.027) had a relatively low positive and insignificant coefficient.

Summary

Agricultural producers may attempt to manage price risk in a variety of ways such as lowering debt, diversifying, using government programs, as well as using forward contracts, hedging with futures or hedging with options. The objective of this study was to better understand the factors related to futures hedging by agricultural producers in Western Canada. Grain producers in Saskatchewan and Manitoba were surveyed about the risk management practices employed on their farms. A total of 293 surveys were collected.

Of the survey respondents, 73% have tried using futures to hedge their price risk. 27% indicated they have never used futures, 24% indicated they rarely use futures, 24% use futures an average amount, 21% use futures often, while only 5% use futures for hedging very often. The probit model was used to estimate factors affecting decisions of producers to hedge their price risk with futures.

Four variables groups were identified including: 1) risk behavior, 2) knowledge and attitudes, 3) farm characteristics, and 4) demographics.

Under the first variable group, risk behavior, hedging with forward contracts, hedging with options and speculating with futures showed statistically significant explanatory power. The more producers used each of these risk management methods, the more they used futures for hedging. When producers had a high importance placed

on low brokerage fees, they used futures more often to hedge price risk. For the third variable group, farm characteristics, results indicated that larger farms used futures more often for hedging. Finally, regarding demographics, producers in Manitoba hedged more than producers from Saskatchewan.

This study should be useful for Canadian risk management firms, policy makers, and governments, as relatively few risk management studies such as this have been conducted in Western Canada. Such studies should also be of particular interest to agricultural policy makers, who design and implement income stabilization policies for agricultural producers, as well as brokers, financial institutions, and regulators.

Table 3.1 Contingency Table for Frequency of Hedging with Futures: Survey Respondents from Agricultural Producers Risk Management Survey

	Frequency of Hedging with Futures					
Knowledge of Futures and Options	Never	Rarely	Average	Often	Very Often	Total (%)
1-Low Knowledge	11.95	4.10	1.02	0.34	0.34	17.75
2	7.85	5.80	4.78	3.07	0.34	21.84
3	3.75	7.85	10.24	6.83	0.34	29.01
4	2.05	5.80	5.80	9.22	1.37	24.23
5-High Knowledge	1.02	0.68	2.05	1.02	2.39	7.17
Total (%)	26.62	24.23	23.89	20.48	4.78	100.00
Age						
Under 25 years	1.37	3.42	2.74	2.40	0.68	10.62
25-39 years	3.42	3.08	4.45	4.11	1.03	16.10
40-54 years	5.48	5.48	7.53	7.19	2.40	28.08
55-69 years	8.56	7.88	5.48	5.14	0.34	27.40
70 years and older	7.53	4.45	3.77	1.71	0.34	17.81
Total (%)	26.37	24.32	23.97	20.55	4.79	100.00
Years Farming						
Under 5 years	2.40	3.77	2.40	2.05	0.00	10.62
6-14 years	3.42	2.74	4.45	4.45	1.37	16.44
15-29 years	8.22	8.22	9.59	9.59	1.71	37.33
30-40 years	8.56	7.19	4.11	3.42	1.37	24.66
41 years +	3.77	2.40	3.42	1.03	0.34	10.96
Total (%)	26.37	24.32	23.97	20.55	4.79	100.00
Farm Size (Acres)						
0-1000	7.17	2.87	1.79	0.00	0.36	12.19
1001-1750	6.09	5.38	5.02	3.23	0.36	20.07
1751-2999	6.81	7.53	5.73	4.66	0.36	25.09
3000-4999	2.87	5.73	6.81	5.73	2.15	23.30
5000+	1.79	2.51	5.38	7.89	1.79	19.35
Total (%)	24.73	24.01	24.73	21.51	5.02	100.00

Table 3.1 Continued Contingency Table for Frequency of Hedging with Futures: Survey Respondents from Agricultural Producers Risk Management Survey

	Frequency of Hedging with Futures					
Education Level	Never	Rarely	Average	Often	Very Often	Total (%)
< Grade 12	5.19	4.50	3.81	2.08	1.04	16.61
Grade 12	9.69	11.07	7.96	7.96	1.73	38.41
2 year college	8.65	5.54	5.54	6.23	1.04	26.99
4 Year University	3.11	2.77	6.57	3.81	1.04	17.30
> 4 Year University	0.00	0.35	0.00	0.35	0.00	0.69
Total (%)	26.64	24.22	23.88	20.42	4.84	100.00
Farm Income	Never	Rarely	Average	Often	Very Often	Total (%)
Less than $30,000	9.45	5.45	4.00	2.91	1.45	23.27
$30,000-$49,999	5.09	7.64	6.18	4.73	1.45	25.09
$50,000-$69,999	2.91	4.00	4.36	3.27	0.36	14.91
$70,000-$99,999	2.55	1.45	1.45	4.00	0.36	9.82
$100,000 or above	5.45	6.18	8.00	5.82	1.45	26.91
Total (%)	25.45	24.73	24.00	20.73	5.09	100.00
Full Time versus Part Time Farming						
Part	4.83	4.48	2.76	3.79	0.69	16.55
Full	22.07	19.66	21.03	16.55	4.14	83.45
Total (%)	26.90	24.14	23.79	20.34	4.83	100.00
Off-Farm Income						
Less than $10,000	9.75	13.36	10.11	6.86	2.89	42.96
$10,000-$19,999	5.42	2.89	4.33	2.17	1.08	15.88
$20,000-$29,999	5.05	5.78	3.25	3.25	0.36	17.69
$30,000-$39,999	2.89	1.08	2.17	0.72	0.36	7.22
$40,000 and above	2.53	1.81	3.97	7.58	0.36	16.25
Total (%)	25.63	24.91	23.83	20.58	5.05	100.00

Table 3.2 Contingency Table for Frequency of Hedging with Forward Contracts: Survey Respondents from Agricultural Producers Risk Management Survey

	Frequency of Hedging with Forward Contracts					
Knowledge of Futures and Options	Never	Rarely	Average	Often	Very Often	Total (%)
1-Low Knowledge	8.19	4.44	2.39	2.39	0.34	17.75
2	6.14	6.83	5.12	3.07	0.68	21.84
3	4.10	5.46	10.58	7.85	1.02	29.01
4	1.37	4.10	5.46	9.56	3.75	24.23
5-High Knowledge	0.00	0.00	2.05	2.39	2.73	7.17
Total (%)	19.80	20.82	25.60	25.26	8.53	100.00
Age						
Under 25 years	0.68	2.40	3.77	3.42	0.34	10.62
25-39 years	2.74	2.40	5.14	4.11	1.71	16.10
40-54 years	5.14	5.14	6.51	6.85	4.45	28.08
55-69 years	6.85	5.48	5.82	8.22	1.03	27.40
70 years and older	4.45	5.48	4.45	2.74	0.68	17.81
Total (%)	19.86	20.89	25.68	25.34	8.22	100.00
Years Farming						
Under 5 years	1.71	2.05	3.08	3.77	0.00	10.62
6-14 years	2.74	2.74	5.48	4.11	1.37	16.44
15-29 years	7.88	7.53	9.59	8.56	3.77	37.33
30-40 years	5.14	6.16	4.45	6.51	2.40	24.66
41 years +	2.40	2.40	3.08	2.40	0.68	10.96
Total (%)	19.86	20.89	25.68	25.34	8.22	100.00
Farm Size (Acres)						
0-1000	6.09	3.23	2.15	0.36	0.36	12.19
1001-1750	4.66	5.73	6.09	2.15	1.43	20.07
1751-2999	3.58	7.17	5.73	7.53	1.08	25.09
3000-4999	2.15	3.58	7.17	7.53	2.87	23.30
5000+	0.72	1.43	5.38	8.60	3.23	19.35
Total (%)	17.20	21.15	26.52	26.16	8.96	100.00

Table 3.2 Continued Contingency Table for Frequency of Hedging with Forward Contracts: Survey Respondents from Agricultural Producers Risk Management Survey

	Frequency of Hedging with Forward Contracts					
Education Level	Never	Rarely	Average	Often	Very Often	Total (%)
< Grade 12	3.81	5.19	4.50	1.73	1.38	16.61
Grade 12	8.65	10.03	10.03	6.92	2.77	38.41
2 year college	4.84	3.46	5.19	10.38	3.11	26.99
4 Year University	2.77	1.73	6.23	5.54	1.04	17.30
> 4 Year University	0.00	0.35	0.00	0.35	0.00	0.69
Total (%)	20.07	20.76	25.95	24.91	8.30	100.00
Farm Income						
Less than $30,000	6.55	6.18	3.27	5.45	1.82	23.27
$30,000-$49,999	4.36	6.55	7.64	4.00	2.55	25.09
$50,000-$69,999	3.27	1.82	4.00	5.09	0.73	14.91
$70,000-$99,999	1.45	1.45	2.55	2.91	1.45	9.82
$100,000 or above	3.64	4.73	8.36	8.00	2.18	26.91
Total (%)	19.27	20.73	25.82	25.45	8.73	100.00
Full Time versus Part Time Farming						
Part	4.83	3.79	3.45	3.79	0.69	16.55
Full	15.17	16.90	22.41	21.03	7.93	83.45
Total (%)	20.00	20.69	25.86	24.83	8.62	100.00
Off-Farm Income						
Less than $10,000	5.42	11.55	11.91	8.66	5.42	42.96
$10,000-$19,999	3.97	2.89	3.25	3.97	1.81	15.88
$20,000-$29,999	5.05	3.61	4.33	3.97	0.72	17.69
$30,000-$39,999	2.89	0.36	2.53	1.08	0.36	7.22
$40,000 and above	1.81	2.53	3.97	7.58	0.36	16.25
Total (%)	19.13	20.94	25.99	25.27	8.66	100.00

Table 3.3 Contingency Table for Frequency of Hedging with Options: Survey Respondents from Agricultural Producers Risk Management Survey

	Frequency of Hedging with Options					
Knowledge of Futures and Options	Never	Rarely	Average	Often	Very Often	Total (%)
1-Low Knowledge	13.31	3.41	0.68	0.00	0.34	17.75
2	10.24	4.44	5.80	1.37	0.00	21.84
3	9.22	8.53	8.53	2.73	0.00	29.01
4	4.44	9.56	5.46	4.44	0.34	24.23
5-High Knowledge	2.05	1.37	1.02	1.71	1.02	7.17
Total (%)	39.25	27.30	21.50	10.24	1.71	100.00
Age						
Under 25 years	3.08	3.77	3.08	0.68	0.00	10.62
25-39 years	6.51	5.48	3.08	0.68	0.34	16.10
40-54 years	10.27	5.14	8.22	3.08	1.37	28.08
55-69 years	10.27	7.88	5.14	4.11	0.00	27.40
70 years and older	8.90	5.14	2.05	1.71	0.00	17.81
Total (%)	39.04	27.40	21.58	10.27	1.71	100.00
Years Farming						
Under 5 years	4.79	2.05	3.08	0.68	0.00	10.62
6-14 years	5.82	7.88	2.05	0.68	0.00	16.44
15-29 years	13.01	7.19	10.62	5.14	1.37	37.33
30-40 years	10.96	7.53	3.77	2.05	0.34	24.66
41 years +	4.45	2.74	2.05	1.71	0.00	10.96
Total (%)	39.04	27.40	21.58	10.27	1.71	100.00
Farm Size (Acres)						
0-1000	7.17	3.58	0.72	0.72	0.00	12.19
1001-1750	8.96	3.94	6.09	1.08	0.00	20.07
1751-2999	10.39	7.89	4.30	2.15	0.36	25.09
3000-4999	7.89	6.81	5.38	2.15	1.08	23.30
5000+	2.87	6.09	5.38	4.66	0.36	19.35
Total (%)	37.28	28.32	21.86	10.75	1.79	100.00

Table 3.3 Continued Contingency Table for Frequency of Hedging with Options: Survey Respondents from Agricultural Producers Risk Management Survey

	Frequency of Hedging with Options					
Education Level	Never	Rarely	Average	Often	Very Often	Total (%)
< Grade 12	6.23	3.81	4.15	1.73	0.69	16.61
Grade 12	14.53	9.69	9.69	3.81	0.69	38.41
2 year college	11.76	7.96	4.84	2.42	0.00	26.99
4 Year University	6.57	5.54	2.77	2.08	0.35	17.30
> 4 Year University	0.35	0.35	0.00	0.00	0.00	0.69
Total (%)	39.45	27.34	21.45	10.03	1.73	100.00
Farm Income						
Less than $30,000	11.64	5.09	4.36	1.09	1.09	23.27
$30,000-$49,999	8.73	7.64	5.09	3.64	0.00	25.09
$50,000-$69,999	5.09	4.73	3.64	1.45	0.00	14.91
$70,000-$99,999	4.73	2.91	1.82	0.36	0.00	9.82
$100,000 or above	9.09	6.91	6.55	3.64	0.73	26.91
Total (%)	39.27	27.27	21.45	10.18	1.82	100.00
Full Time versus Part Time Farming						
Part	5.17	5.86	3.79	1.72	0.00	16.55
Full	34.48	21.38	17.59	8.28	1.72	83.45
Total (%)	39.66	27.24	21.38	10.00	1.72	100.00
Off-Farm Income						
Less than $10,000	17.33	11.55	9.03	4.33	0.72	42.96
$10,000-$19,999	7.58	2.53	3.61	1.81	0.36	15.88
$20,000-$29,999	7.58	5.78	1.81	2.17	0.36	17.69
$30,000-$39,999	3.25	1.44	2.17	0.00	0.36	7.22
$40,000 and above	3.61	5.78	5.05	1.81	0.00	16.25
Total (%)	39.35	27.08	21.66	10.11	1.81	100.00

Table 3.4 Description of Variables and Survey Response Scores for Probit Model for Frequency of Hedging with Futures by Agricultural Producers (N=293)

Variable Names	Mean Survey Response (N=293)	Description of Variables
Dependent Variable		
Frequency of hedging with futures	2.53	1 = never,…, 5 = very often
Independent Variables		
Risk Behavior		
Hedging with Forward Contracts	2.82	1 = never,…, 5 = very often
Hedging with Options	2.08	1 = never,…, 5 = very often
Speculating with Futures	2.22	1 = never,…, 5 = very often
Knowledge and Attitudes		
Knowledge of Futures and Options	2.81	1 = low knowledge,…, 5 = high knowledge
Trust Futures Brokers	2.58	1 = low trust,…, 5= high trust
Importance of Low Brokerage Fees	3.21	1 = very unimportant,…, 5 = very important
Farm Characteristics		
Debt Level	3.02	1 = low,…, 5 = high
Farm Size	3.17	1 = <1000, 2 = 1000-1750, 3 = 1751-2999, 4 = 3000-4999, 5 = 5000+
Fertilizer Use	3.77	1 = low,…, 5 = high
Zero Tillage	3.19	1 = low,…, 5 = high
Demographics		
Age	3.26	1 =<25, 2 = 25-35, 3 = 36-45, 4 = 46-55, 5 = 56+
Manitoba vs. Saskatchewan†	0.41	1 = Manitoba, 0 = Saskatchewan
Farm Income	2.92	1 =<30,000, 2 =30,000-49,999, 3 =50,000-69,999, 4 =70,000-99,999, 5 =100,000+

Note: "†" denotes variables with binary scale, other variables are on 1 to 5 point Likert scale.
Note: Missing observations were handled through SPSS missing data procedure

Figure 3.1 Dependent Variable, Frequency of Using Futures for Hedging, for Agricultural Producers Risk Management Survey

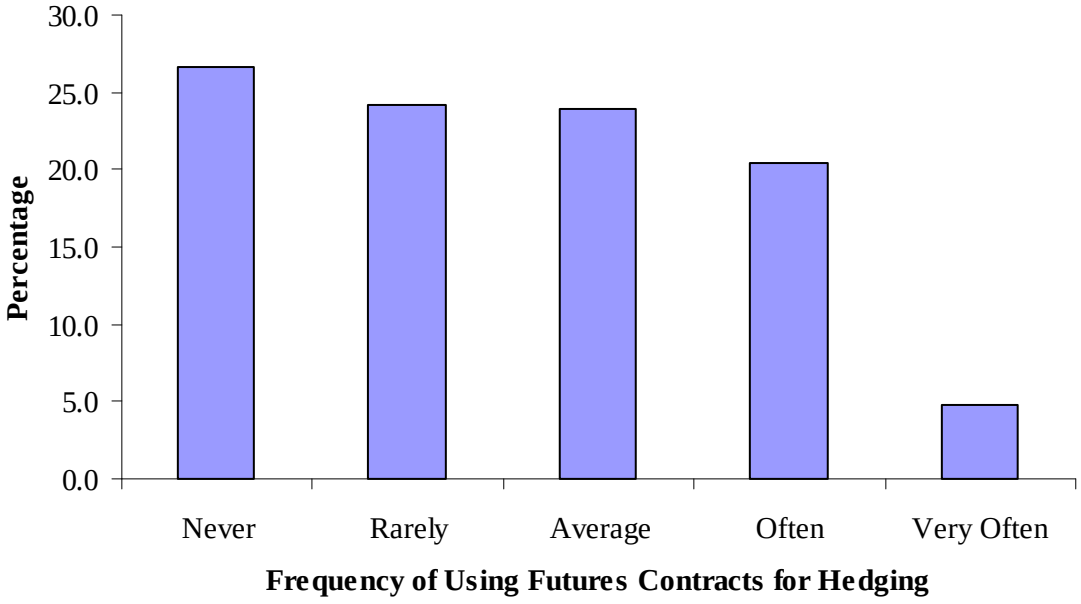

Figure 3.2 Frequency of Using Forward Contracts for Hedging, Independent Variable, from Agricultural Producers Risk Management Survey

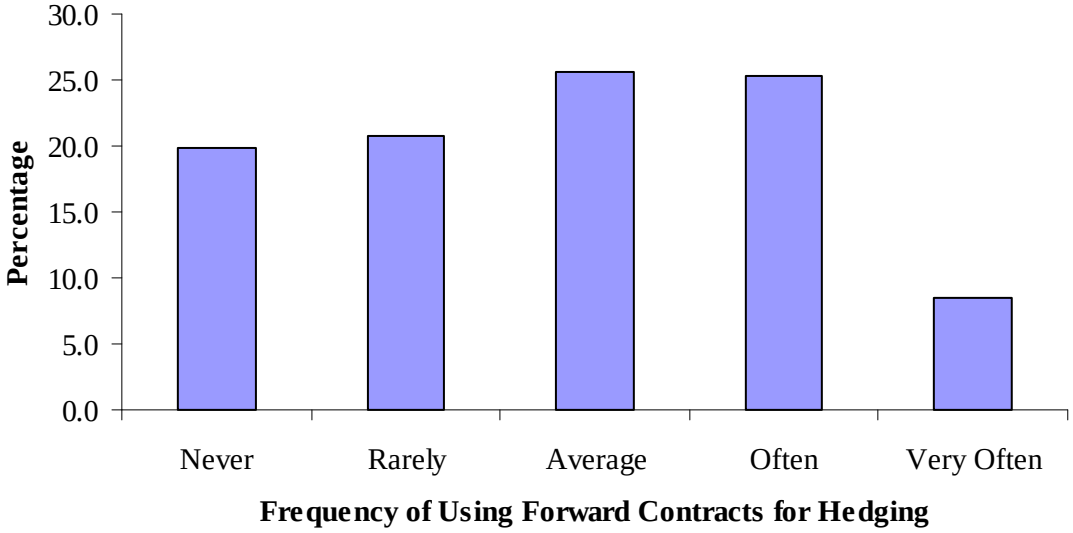

Figure 3.3 Frequency of Using Options for Hedging, Independent Variable, from Agricultural Producers Risk Management Survey

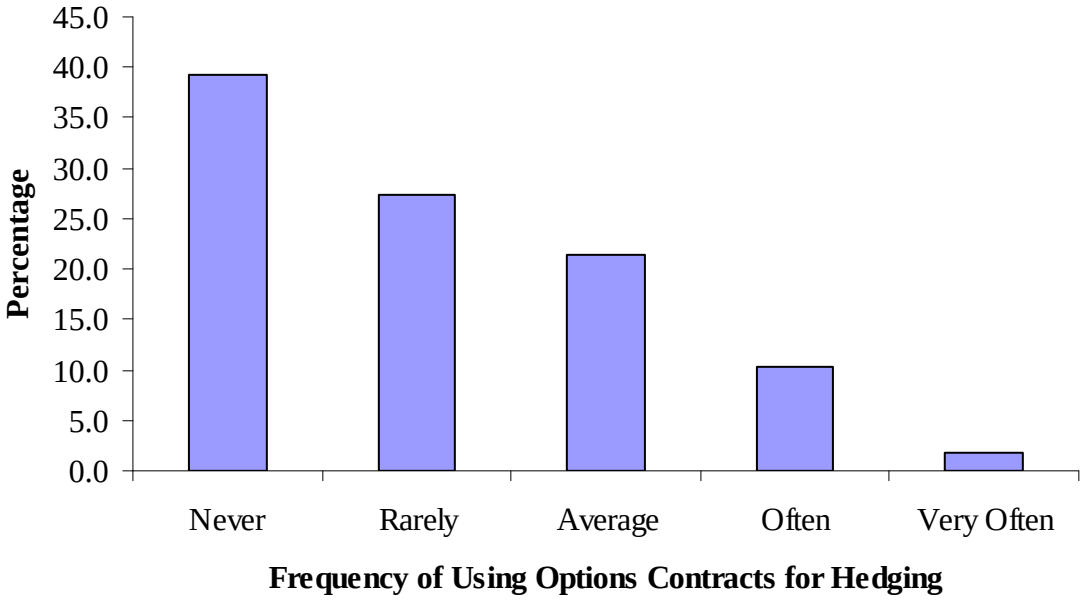

Figure 3.4 Frequency of Using Futures for Speculating, Independent Variable, from Agricultural Producers Risk Management Survey

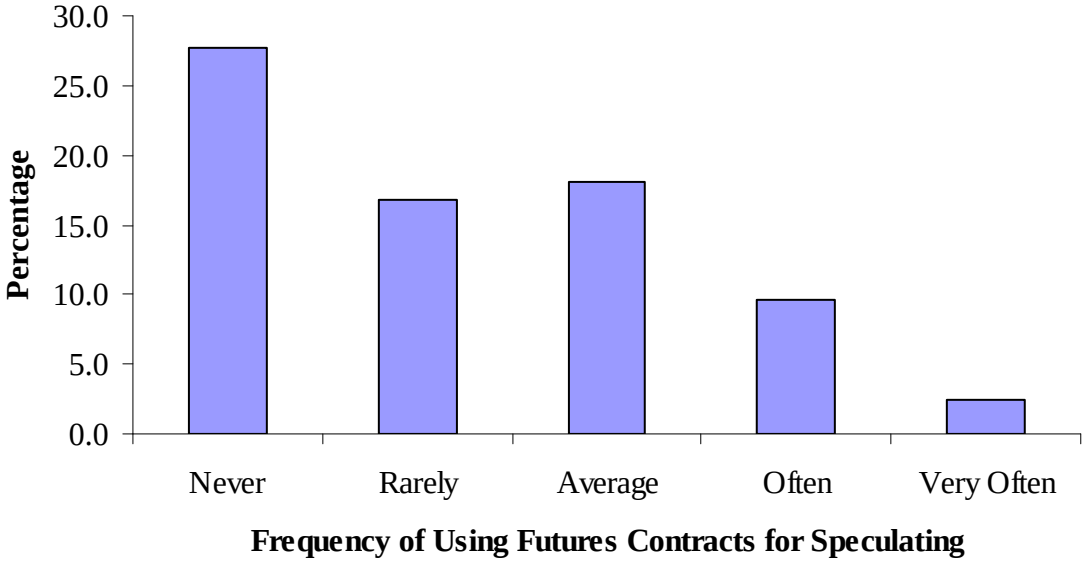

Figure 3.5 Knowledge of Futures and Options, Independent Variable, from Agricultural Producers Risk Management Survey

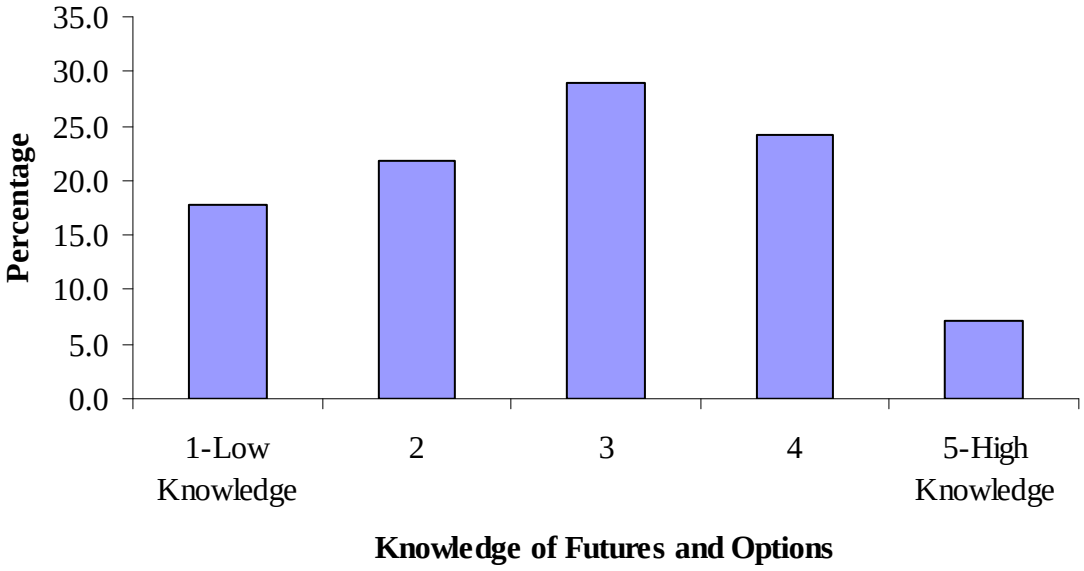

Figure 3.6 Trust Futures Brokers, Independent Variable, from Agricultural Producers Risk Management Survey

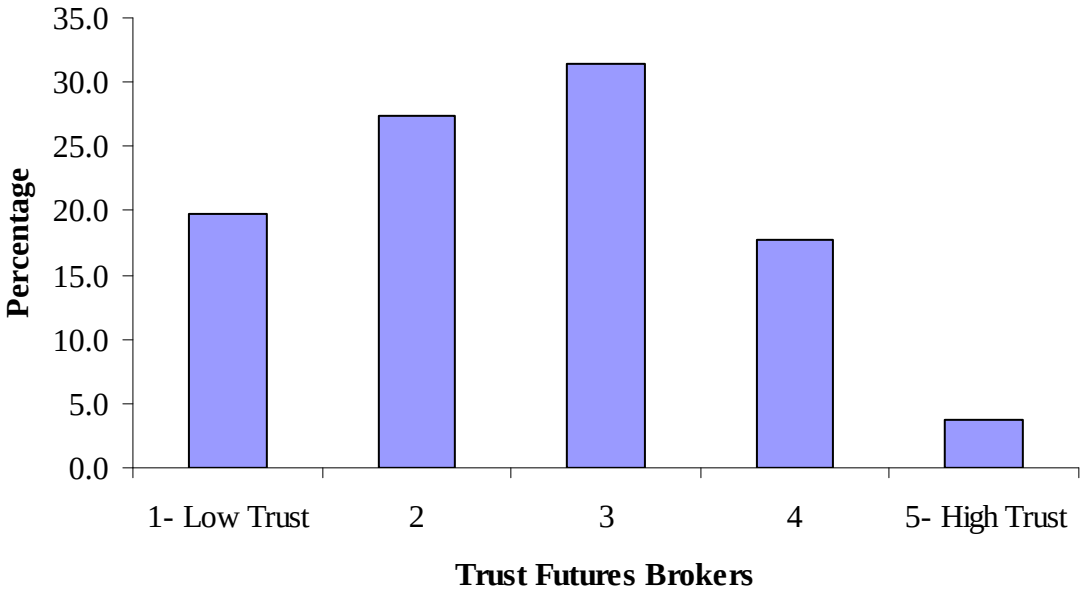

Figure 3.7 Importance of Low Brokerage Fees, Independent Variable, from Agricultural Producers Risk Management Survey

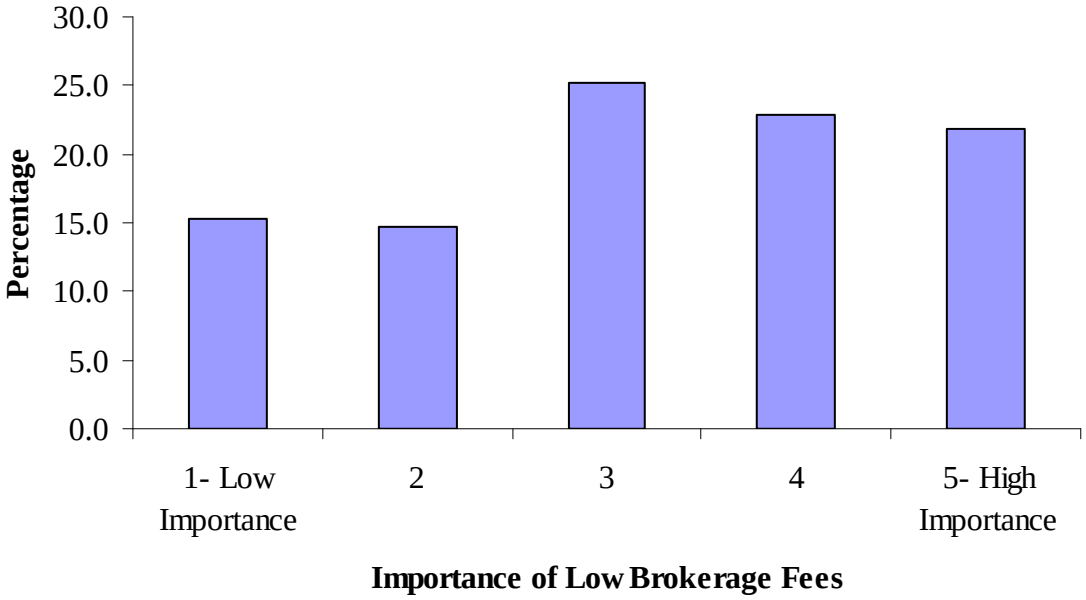

Figure 3.8 Debt Level on Farm, Independent Variable, from Agricultural Producers Risk Management Survey

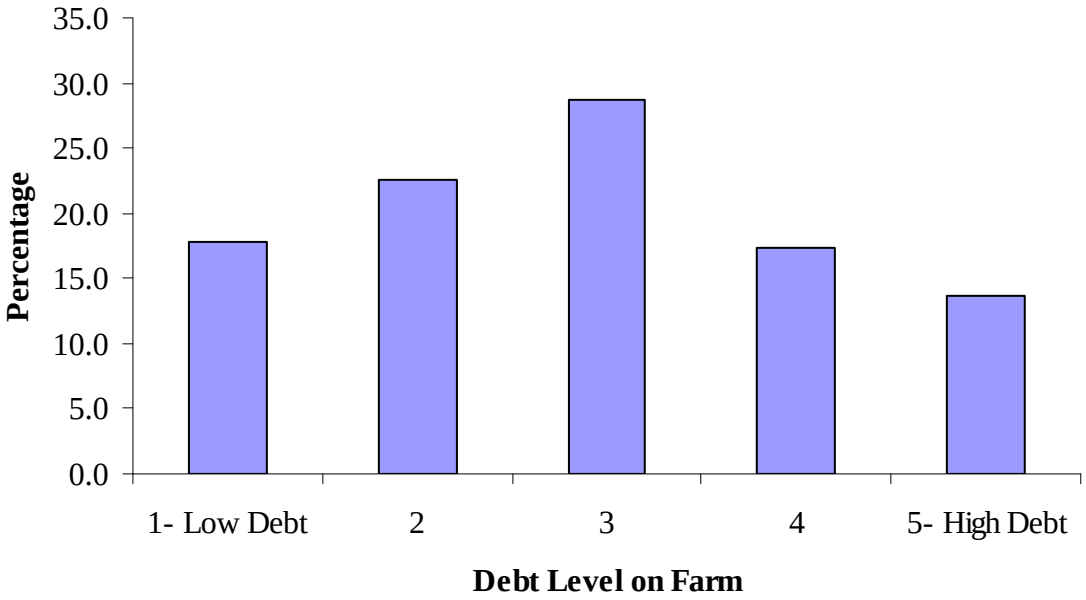

Figure 3.9 Use Level of Fertilizer on Farm, Independent Variable, from Agricultural Producers Risk Management Survey

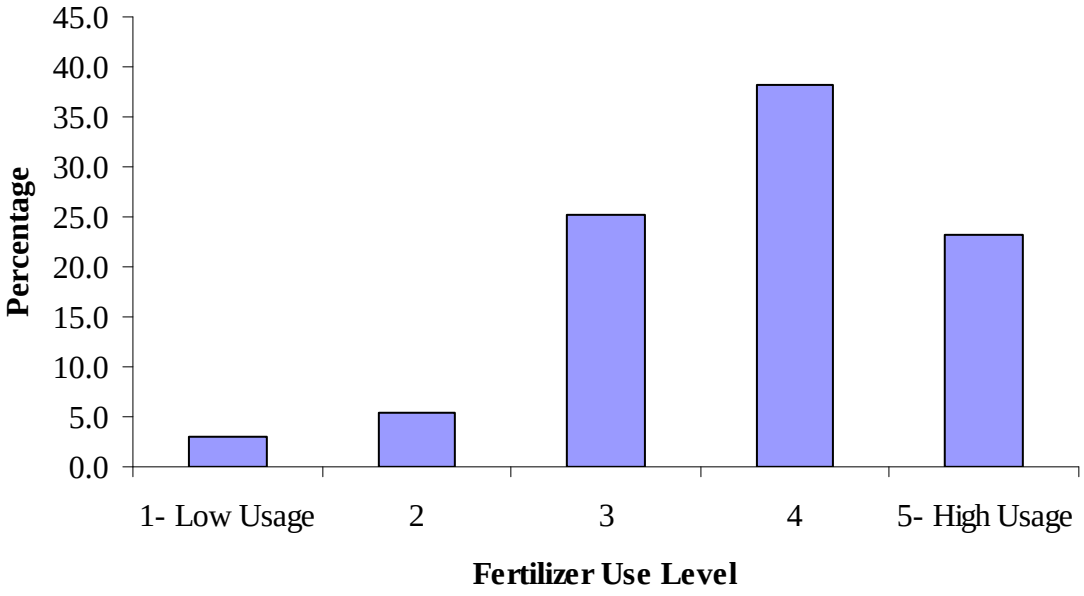

Figure 3.10 Use Level of Zero Tillage, Independent Variable, from Agricultural Producers Risk Management Survey

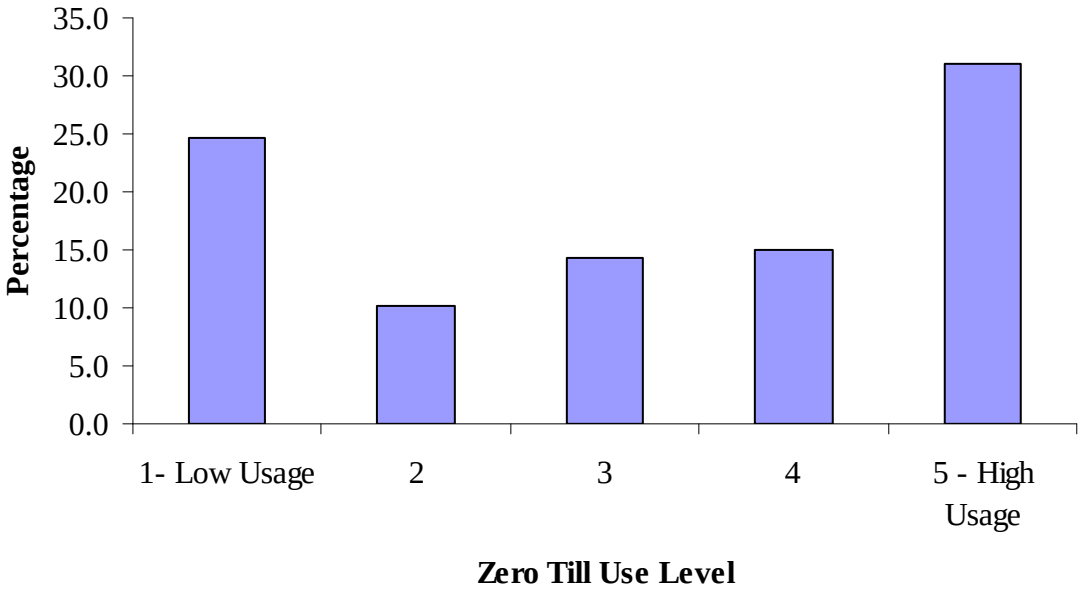

Table 3.5 Frequency of Hedging with Futures: Estimates of the Ordered Probit Model (N=293)

Parameters	Estimated Coefficient	Standard Error Of Coefficient
Risk Behavior		
Hedging with Forward Contracts	0.305***	0.094
Hedging with Options	0.453***	0.097
Speculating with Futures	0.492***	0.091
Knowledge and Attitudes		
Knowledge of Futures and Options	0.053	0.099
Trust futures brokers	0.107	0.102
Importance of low brokerage fees	0.137**	0.066
Farm Characteristics		
Debt Level	0.044	0.076
Farm Size	0.156*	0.087
Fertilizer Use	0.014	0.100
Zero Tillage	0.037	0.069
Demographics		
Age	-0.062	0.083
Manitoba vs. Saskatchewan†	0.413**	0.210
Farm Income	0.027	0.058
Pseudo R-Square		
Cox and Snell	0.630	
Nagelkerke	0.664	
McFadden	0.334	

Note:
*** indicates significance at 1% level
** indicates significance at 5% level
* indicates significance at 10% level
Note: "†" denotes variables with binary scale, other variables are on 1 to 5 point Likert scale.
Note: Missing observations were handled through SPSS missing data procedure

CHAPTER 4

SUMMARY

This study consisted of two parts. Part one evaluated agricultural producers perceptions of crop insurance, and part two identified factors that could be influencing agricultural producers' frequency of hedging price risk with futures. Each part is summarized below.

The objective of part one of the study was to try to determine the factors affecting perceptions of crop insurance in Western Canada. Two variable groups were identified: crop insurance background, and demographics. Data was generated from a survey of agricultural producers in Saskatchewan and Manitoba, (Canada) and the model was estimated using the probit method. A sample size of 293 respondents was used for the study.

Two variable groups, crop insurance background, and demographics, showed statistically significant explanatory power. For the first group, crop insurance background, results indicated that when crop insurance adjustors fairly assess claims and pay producers quickly, producers are likely to have a more positive perception of crop insurance. Also, producers that had previously bought crop insurance were found to have a more positive perception of crop insurance. For the second group, demographics, results indicated that producers living in Manitoba had a more positive perception of crop insurance than those in Saskatchewan.

The information from part one of the study should help crop insurance firms gain a better understanding of the factors shaping perceptions towards crop insurance. Such information may also be helpful for insurers to potentially increase the participation rates

of agricultural producers who buy crop insurance, which in turn may reduce the cost of the insurance through reduced administration costs, and reduce the problem of adverse selection.

The second part of this study explored frequency of using futures for hedging price risk. Agricultural producers may attempt to manage price risk in a variety of ways such as lowering debt, diversifying, using government programs, as well as using forward contracts, hedging with futures or hedging with options. The objective of part two was to better understand the factors related to futures hedging by agricultural producers in Western Canada. Grain producers in Saskatchewan and Manitoba were surveyed about their risk management practices. The same survey data from part one was used for this analysis.

Of the survey respondents, 73% have tried using futures to hedge their price risk. 27% indicated they have never used futures, 24% indicated they rarely use futures, 24% use futures an average amount, 21% use futures often, while only 5% use futures for hedging very often. A probit model was used to estimate factors affecting decisions of producers to hedge their price risk with futures.

Four variables groups were identified including: 1) risk behavior, 2) knowledge and attitudes, 3) farm characteristics, and 4) demographics. Under the first variable group, risk behavior, hedging with forward contracts, hedging with options, and speculating with futures showed statistically significant explanatory power. The more producers used each of these risk management methods, the more likely they were to use futures for hedging. When producers had a high importance placed on low brokerage fees, they were also more likely to hedge price risk. For the third variable group, farm

characteristics, results indicated that larger farms used futures more often for hedging. Finally, regarding demographics, producers in Manitoba hedged more than producers from Saskatchewan.

This study should be useful for Canadian risk management firms, policy makers, and governments, as relatively few risk management studies such as this have been conducted in Western Canada. Such studies may also be of particular interest to agricultural policy makers, who design and implement income stabilization policies for agricultural producers, as well as brokers, financial institutions, and regulators.

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