Use and Adoption of Marketing Methods by Western Canadian Producers

A Thesis

Submitted to the College of Graduate Studies and Research

in Partial Fulfillment of the Requirements

for the Degree of Masters of Science

In the Department of Bioresource Policy, Business and Economics

University of Saskatchewan

By

Geoff Backman

PERMISSION TO USE

The author has agreed that the University of Saskatchewan and its library may make this thesis freely available for inspection. The author further has agreed that permission for extensive copying of this thesis for scholarly purposes may be granted by the professor or professors who supervised the thesis work or, in their absence, by the Head of the Department or Dean of the College in which the thesis work was done. It is understood that any copying or publication or use of this thesis or parts thereof for financial gain shall not be allowed without the author's permission. It is also understood that due recognition will be given to the author of this thesis and the University of Saskatchewan in any scholarly use of the material in this thesis.

Request for permission to copy or make other use of the material in this thesis in whole or in part should be addressed to:

Department Head

Department of Bioresource Policy, Business and Economics

51 Campus Drive, Room 3D34

University of Saskatchewan Saskatoon, Saskatchewan

Canada S7N 5A8

Abstract

The use of forward marketing techniques is viewed in this thesis as a technological adoption by the producer and has been an area of interest for research in the United States since the 1980s. Unfortunately this research has not occurred in Canada. Reasons for this lack of research may include that one institution was legislated the task of marketing the majority of Canadian export wheat. As of August 12th, 2012 Canadian policy has changed to allow all Canadian wheat to be marketed by producers.

This thesis attempts to add some geographic diversity to the literature by asking Canadian producers for a history of their marketing choices. Comparisons are made between the two most prevalent crops of wheat and canola. This thesis also takes advantage of the major change in policy to attempt to identify similarities between producers who adopt specific marketing techniques.

Producers were directly surveyed on their use of marketing techniques from the year 2010 through 2013. Data from a total of 295 responses are presented to give an overview of what technologies are being used to market wheat and canola by producers on the Canadian prairie. Producers were also asked questions about their personality and farm enterprise, and to identify if they had increased their use of a marketing technique after the policy change of 2012. The responses were analyzed through probit regression.

This thesis finds that forward contracting is the most prevalent marketing technique used by Canadian producers for wheat and canola. Use of futures markets and options markets are a distant second and third respectively. Rates of use by Canadian producers are found to be similar to rates reported in US research.

Regression analysis of producers who increased their use of similar marketing techniques suggests that they share similar personal attributes. Forward contract use is found to increase with previous experience in use. Futures market use is found to increase among those inclined to believe that they control the world around them. Options market use is found to increase among those most comfortable with risk. Several farm demographic variables are also found to be shared among producers, and these findings are found to support similar findings in previous research from the US.

Acknowledgements

I would like to thank coffee. Without a constant supply of caffeine this research would not have been possible.

Thank you to Eric Micheels, whose constant support and advice has been instrumental to the completion of this work.

Thank you to Robert Roy and Jill Hobbs, whose comments have clarified the points I've attempted to make in this thesis.

Thank you to my parents, David Backman and Joy Dodson, whose love and financial support have allowed me to reach this level of education.

Thank you to my lifelong friend Andrew Purssell, who provided emotional support and pointed out many pitfalls found by one who's walked this path before.

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction

Due to the royal ascent of bill C-18 which came into effect on August 1st 2012, the Canadian wheat market is now deregulated (Parliament of Canada, 2011). Previous to this change, all purchasing and marketing of wheat in Alberta, Saskatchewan, Manitoba, and the British Columbia Peace River region (all together referred to as the Canadian prairie) was handled by a Crown grain marketing agency known as the Canadian Wheat Board (CWB) (Parliament of Canada, 1985). The sale and export of wheat outside of this area, specifically Ontario, Quebec, and the rest of British Columbia, was not under the control of the CWB. There were also some specific exceptions, such as the sale of feed wheat, barley, and oats. With the deregulation of the Canadian wheat markets, the marketing options for Canadian producers are comparable to those available in the United States. This creates the opportunity for wheat marketing decisions of Canadian producers to be analyzed and compared to previous research from the US (Davis et al., 2005; Goodwin and Schroeder, 1994; Musser et al., 1996; Sartwelle et al., 2000; Schroeder et al., 1998; Shapiro and Brorsen, 1988; Wolf, 2012). Given the short time period producers have had in a truly open wheat market, many Canadian producers may not be able to draw from previous experience in marketing wheat. This provides an opportunity to analyze the marketing decisions Canadian farmers are making and how differences in marketing decisions may be driven by differences in human capital.

This thesis focuses on expanding the literature on farm marketing decisions. Specifically, this thesis asked producers about changes in their marketing choices due to the legislative effect of bill C-18. As a result, this work continues and expands on previous research into understanding producers' perceptions and use of forward pricing tools. This thesis asks specifically about the

use of forward contracts, commodity futures market contracts, and commodity options market contracts. This thesis also continues the comparisons of producer attributes from previous research. Specific personality attributes of interest that relate to the use of these tools are the producer's perception of control of the world around them, their comfort with risks from fluctuating commodity prices, and their experience with marketing commodities previous to 2012.

This thesis contributes to the economic literature on the marketing methods of producers in general. Specifically, this research adds to the literature on the marketing practices of producers in the Canadian prairie, a subject of limited study. While Statistics Canada does track total deliveries to handlers (Statistics Canada, 2014b), the contracted amounts are not tracked and neither is producers' use of commodity futures markets. In order to understand producers' marketing behavior, a history of marketing choices for each crop needs to be collected directly from producers themselves.

This thesis investigates changes in Canadian producers' wheat marketing behavior given the major policy changes on August 1, 2012.   These policy changes have given producers full control over their marketing of wheat. As there also exists a mature commodity market for canola which has not had a policy change, this thesis will compare marketing changes between these two major Canadian crops. Therefore, the questions to be asked with respect to pricing of production before harvest are:

1. Have producers in the Canadian prairie changed their use of forward contracts since the 2012 marketing year?

2. Have producers in the Canadian prairie changed their use of futures and options markets since the 2012 marketing year?

3. Can common attributes be identified among the producers who chose to increase use of forward marketing methods?

If all agricultural producers are price takers, in that their production amount has no impact on the price they receive, and they face dramatic fluctuations in the prices they receive for their production, then why do only some producers choose to include the use of forward contracts and commodity markets into their business strategies? Given that price fluctuations, or price risks, can significantly impact a producer's income, it is expected that structured contracts and hedging using commodity futures markets, which is explained in detail later, would be attractive to producers. Figures 1.1 and 1.2 show the fluctuations that occur in the Saskatchewan cash prices for wheat and canola.

Figure 1.1: Average Cash Prices in Saskatchewan for #1 CWRS (April 2014 - Sept 2015)
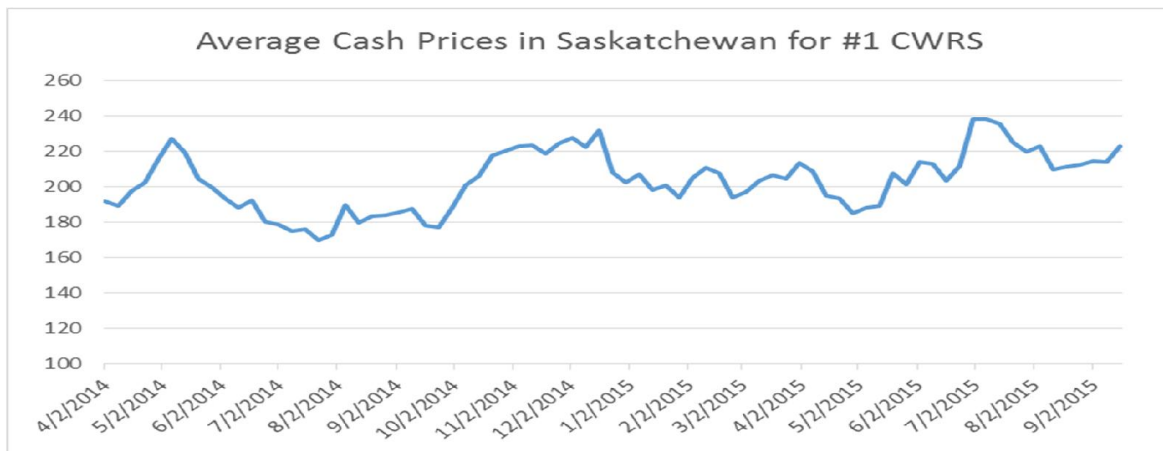
Source: (Government of Saskatchwan, 2015)

Figure 1.2: Average Cash Prices in Saskatchewan for #1 Canola (Jan 2012 - Sept 2015)
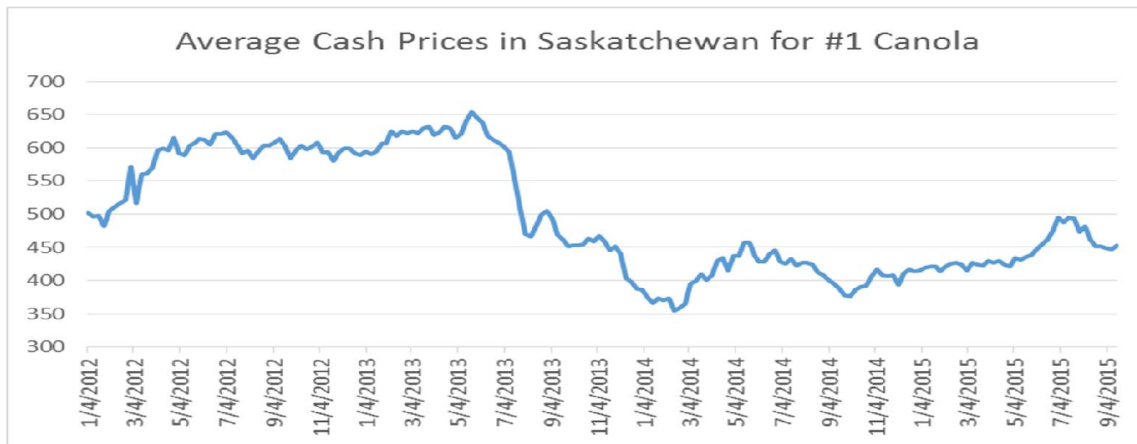
Source: (Government of Saskatchwan, 2015)

The following sections provide some general background into the main subjects of concern in this thesis. First, a brief overview of the Canadian wheat market situation is provided. After the history, a general theoretical overview is provided on the producer attributes of interest to this thesis. Finally, a chapter breakdown of the thesis is provided at the end of this introduction.

1.1 History of Canadian Grain Markets

The Canadian wheat board was created by the Canadian Wheat Board Act in 1935. Originally, deliveries to the CWB were voluntary. However, this changed in 1943 due to World War Two, and the Canadian wheat market was placed under a single desk organization. The CWB was empowered to market all Canadian grains, oilseeds, and Ontario corn (CIGI, 1993). Also at this time, wheat futures trading was suspended and deliveries became compulsory (CIGI, 1993). Under this legislation, the CWB was the only agency that producers could sell their production to, and all global buyers had to negotiate exports with the CWB. Because of this arrangement, the CWB was referred to as a single desk marketer. Variations in the legislation over the subsequent years resulted in the CWB's responsibility being reduced to the marketing of wheat

and barley produced in the prairie region for export and for human consumption domestically (CIGI, 1993). Under this organization, producers were signaled on how much to deliver through contracts or quotas (CIGI, 1993). Producers who made contracts could be called on to deliver a portion of, or their entire contract when needed. Under the quota system, producers were given a maximum deliverable amount for a particular grain dependent on the size of their operation. Producers were able to use this information to plan their yearly planting accordingly.

The Canadian Government changed the domestic wheat and barley market significantly when it passed bill C-18, titled "Marketing Freedom for Grain Farmers Act", into law on November 28th 2011. As of August 1st 2012, the CWB was transitioned from a government agency to a private grain handling corporation (Parliament of Canada, 2011). Wheat exports which were previously negotiated through the CWB are now negotiated though grain handling companies. This means that signaling of volumes demanded by each company are completely price based, and can fluctuate daily depending on a company's expected supply or demand.

1.2 Overview of Western Canadian Grain Marketing

Given the regional differences between this thesis and previous literature, the main crops of interest also differ. As of 2011, canola and wheat were the most planted crops in the Prairie provinces (Statistics Canada, 2014b). Both crops also have commodity futures markets and options markets for hedging opportunities. Canola has been traded as a commodity on an open market in Canada since 1963, originally under the Winnipeg Commodity Exchange and now under the Intercontinental Exchange (Intercontinental Exchange, 2007). This has provided opportunities for canola producers to gain marketing experience.

In comparison, there has not been an open commodity market in Canada for wheat until 2012 (Intercontinental Exchange, 2013). Due to the single desk marketing of the CWB, no futures markets for Canadian milling wheat were permitted. Producers could attempt to hedge using commodity markets in the United States. Choices in the US include the Chicago soft red wheat futures, the Kansas City hard red wheat futures, and the Minneapolis hard red spring wheat futures (CME Group, 2016a, 2016c; Minneapolis Grain Exchange, 2015). As of 2012, the Intercontinental Exchange has opened a Canadian milling wheat futures market which is traded in Canadian dollars (Intercontinental Exchange, 2013).

Despite the availability of the Canadian milling wheat futures market, participation has not occurred. As of 2016, the time of writing this thesis, the Canadian milling wheat futures market have been illiquid, meaning no trading has occurred for the past two years (Intercontinental Exchange, 2016b). It can then be assumed that any stated use of wheat futures markets by Canadian producers is occurring in the US markets. While trading occurs on the canola futures market, the options market volume is low enough to consider it illiquid as well (Intercontinental Exchange, 2016a).

Previous literature has also found that futures and options market use by US producers is generally less prevalent than forward contracting, sometimes drastically so (Davis et al., 2005; Goodwin and Schroeder, 1994; Musser et al., 1996; Sartwelle et al., 2000; Schroeder et al., 1998; Shapiro and Brorsen, 1988; Wolf, 2012). This thesis asks about producers' annual usage of forward contracts, futures markets, and options markets for both wheat and canola from the years 2010 to 2013. These questions are used to build a history of use for analysis.

1.3 Behavioral Factors Affecting Risk Management Usage

As other studies have examined how farm characteristics influence marketing use, this thesis will investigate the effect of personal characteristics on producer marketing decisions in a time of market change. The following sections highlight the documented importance of several individual characteristics in theory and provide background to develop an understanding as to how these topics are applicable to changes in grain marketing by producers in the Canadian prairie.

1.3.1 Locus of Control

While economists have studied concepts of risk and uncertainty for many years, the variance in an individual's perception of chance occurrences was not a specific topic of research before the 1950s. As individuals interested in the accounting and explaining of perceivably random interactions, economists may have been interested in only perceptions of control and influence, rather than a feeling of helplessness. These views might be similar to Veblen (1899 p. 6-7), who viewed a society without an ambitious and controlling group of individuals as primitive, and that such characteristics were typical of an inefficient society. However, the psychology literature has taken an interest in what they term alienation (Seeman, 1959). Defined as individuals who feel unable to control their own destiny, alienated individuals feel as they are a small cog in a big machine and that they are at the mercy of forces either too strong or too vague to control. These alienated individuals' feelings of powerlessness have been linked to a set of beliefs about personal behavior and its impact on success or failure (McNairn & Mitchell, 1992).

While some individuals feel helpless in situations, others feel that they can exert control on outcomes through personal behaviors. These separate beliefs are further defined as internal and external control (Seeman, 1959). This separation in expectations is defined by Rotter (1966) as

an individual's locus of control. When an individual holds a belief in external control, their reinforcement from gratification is perceived as following some action of their own, but not being entirely contingent upon their action. The external control belief assumes that factors, such as luck, chance, fate, the control of powerful others, or simply a myriad of complex forces surrounding the individual are significantly involved in the outcome. Whereas an individual with a belief in internal control will assume that the event is contingent on their own behavior or their relatively permanent characteristics. However, as Ajzen (1991) points out, it is important not to confuse locus of control with other perceived controls, specifically perceived behavioral control. While locus of control does modify expectations, it is a generalized expectancy. In comparison, perceived behavioral control is the perception of difficulty with performing a specific task (Ajzen, 1991). To use Ajzen's example, one can simultaneously believe that they are able to influence the world around them (internal locus of control), but may also believe that they have a very low chance of becoming an airplane pilot (low behavioral control).

The internal-external variance has been investigated in a number of other contexts as well. Lefcourt and Wine (1969) used experimental situations to measure differences in individual's attention levels in various situations. Their results suggested that those with an internal locus of control pay more attention during problematic events, as they displayed more eye movement, an indicator of attention, and were able to recall more when interviewed afterwards. However, Lefcourt and Wine noted that in "normal" interactions, internals were again more attentive than externals, suggesting that those with an internal locus are more efficient at the assimilation of information when both groups are "not unduly vigilant".

Interest in variance in an individual's perceived locus of control led to Rotter (1966) experimenting with an individual's expectations of rewards, or gratification. Rotter identified

8

that if it is perceived that a situation is being determined by luck or chance or experimenter control, then an individual is unlikely to raise their expectations following a success; similarly, they are unlikely to lower their expectations following a failure. In addition, individuals within a group, in the same situation, will differ in their view of how much control they exert over the situation. These findings led Rotter (1966 p. 1) to state: "The effects of reward or reinforcement on preceding behavior depend in part on whether the person perceives the reward as contingent on his own behavior or independent of it." This is a summation of how locus of control can be considered applicable to marketing decisions.

Previous research suggests that before firms make decisions to adopt new technologies or release a new product, they consider the potential gains and losses (Chen, 1996). If a firm expects that the net benefits may not warrant the adoption, then the firm may not proceed. In order for a producer to adopt and consistently use a marketing method, a producer must believe that their choice is having a significant positive effect on their income. If the producer does not believe that their decisions will significantly affect their income, then there is no reason for any changes to be made, as any extra effort will not be repaid.

1.3.2   Risk Appetite

An individual's risk appetite is defined as a combination of the strength of their preference towards certain outcomes, and their attitude towards risk (Smidts, 1997). Simply put, risk appetite is an individual characteristic which is a measure of the personal comfort with experiencing, or being subject to, risky situations.

The concept stems from mathematical probability and expected returns (Bernoulli, 1738; Von Neumann and Morgenstern, 1944). Every choice has multiple potential outcomes, every

outcome has a probability (P) of occurring, and each outcome has an expected reward (R). By multiplying each outcome's reward by the probability of the outcome and then summing the products, the expected return of the choice can be calculated using equation 1.1.

$$E(R) = \sum_{i=1}^{n} R_i P_i \qquad \textbf{(1.1)}$$

An individual's risk appetite is based on their willingness to accept different expected returns. Those who will only accept a choice with a positive expected return are labeled as having low risk appetite, or as risk averse. Those who would accept a choice with an expected return of zero are labeled as risk neutral. Individuals who are more comfortable with risk, or are risk loving, are those who would be willing to accept a choice with a negative expected return. These individuals are described as having a high risk appetite. Although the concept is broad, in this work the subject of farm marketing means that risk is focused on potential cases of decreased income from farm production.

The concept of individual differentiation in risk perception dates back almost three centuries to the French mathematician Daniel Bernoulli and his work on probability theory. Bernoulli (1738) pointed out that the expected value theorems used in mathematics were different from personal decision making due to the individual bias inherent to personalities, and the potential impacts a result could have on an individual's quality of life. Bernoulli proposed that a potential decision should not be based on the monetary value of the outcome, but on the individual's personal valuation of their potential gains, defined as an individual's utility.

The concept of expected utility theory was further developed by Von Neumann and Morgenstern (1944) into the definition of an individual's utility function. In order for the function to be

10

accurate, the individual must be held to four axioms: completeness, or the ability to define preferences between options; transitivity, or a consistent preference over a group of options; continuity, or the presence of a middle option within a group that acts as a neutral choice; and independence, that all preferences hold in the presence of irrelevant alternatives. The development of this framework allowed for individual preferences to be represented on an interval scale, and therefore be compared amongst a population.

However, Tversky and Kahneman (1981) found inconsistencies in decision making by individuals, specifically the systematic violation of the axiom of transitivity. Experimental work found that decisions were subjective to the framing of the questions. When options with similar expected returns were presented, the responses differed depending on how close given values were to zero, and if the values were positive or negative. Specifically, the response to decisions framed as potential losses was greater than those of potential gains. Other work has found that attitudes toward risk have been found to differ when framed in a short or long time frame (Newbery and Stiglitz, 1981). These results suggest that decision making is strongly determined by an individual's reference point, or the combination of diverse personal factors, societal expectations, and personal expectations. Tversky and Kahneman (1981) suggest that decision making consists of two phases, an initial phase for framing and a subsequent phase of evaluation, and that decisions are made in isolation of previous decisions and in exclusion of assets in order to simplify the cognitive strains associated with decision making. Therefore, these findings complicate research into the identification of risk appetite with respect to decision making as many subjects lack objective standards, and therefore subject reference points will not be easily discernable to researchers.

The issue of framing must be kept in mind when investigating risk appetite with respect to the farm business, as the agricultural industry faces many unknowns. A farm's financial viability is tied to its production, and this production is at risk to natural forces such as weather, pests, and disease (Newbery and Stiglitz, 1981). Income from production is also at risk from fluctuation in global markets. Producers face fluctuation in the prices of both their inputs and outputs due to global events beyond their control, which results in unpredictable returns. Given the diversity in sources of risk, this work focuses its questions on risk appetite around two areas of interest: the producer's comfort with taking risks when marketing a specific commodity, and their comfort with taking risks that involve the entire farm.

1.3.3 Human Capital

The idea of human capital comes from the realization that labor, the physical work of humans, is different from other forms of capital, such as machines. It is a recognition that the wages paid for labor in advanced economies are differentiated amongst workers due to the investments made into individuals, such as education and on-the-job training (Becker, 1971). There are often tangible benefits for the individuals who make the investment, as studies have found that professionals with high levels of human capital are more likely to deliver consistent and high quality services (Mincer, 1974). Education is not the only source of valuable human capital, as industry specific or transferrable experience can be valued in workers. Campbell (2013) found that employees who had left jobs to participate in start-up companies received sustained wage benefits over their peers. The human capital gained from being involved in a start-up made these individuals more attractive to the broader labor market.

Information can also be accumulated via information diffusion. By approaching friends, neighbors, and professionals, a producer can learn about how marketing methods work and about

how marketing tactics have played out previously. Similar to the adoption of physical technologies, farmers may wish to consult with other producers who have used different marketing methods effectively. For example, previous research has suggested that individuals are more likely to seek the opinions of neighbors when they are considering the adoption of new technologies or products that they consider risky (Rogers, 1976).

One of the most common measures of human capital investment is formal education. Investments in continued schooling often represent thousands of dollars in tuition, and years of delayed entry into the workforce; a significant opportunity cost in forgone earnings (Becker, 1971, 1976). However, the benefits to an individual's lifetime earnings from greater education have been recognized for some time (Mincer, 1974). Updated research into the value of educational investments has continually reinforced the theory that education increases earnings. Psacharopoulos (1994) applied the theory of education as an investment to a global scale, and found it to generally hold with variation based on country, gender, and decision to work in the private or public sector. Chuang and Lee (2004) compared wages of individuals with more years of work experience to individuals with more education. They found that when everything was held equal, those with more work experience received higher wages. However, when education was added, the effects of work experience on wage declined, while the effect of industry specific human capital increased with education. In addition, a credential from a university informs others, such as potential clients or employers, that the individual has obtained industry specific human capital (Arrow, 1973).

An important differentiation to make with respect to human capital is the valuation between education and specific training for occupations. The amount of schooling by high wage professions such as doctors, lawyers, or physicists tend to require many years of attendance at

13

specialized schools. Generalized education can potentially "waste" many hours of an individual's productive time if they are investing to better perform a specific occupation (Becker, 1971). Therefore, there is potential for specialized classes and training to provide similar benefits as generalized education, when being compared on the competency at specific tasks.

Farm marketing is not a simple task, and the producer's willingness to use a variety of marketing methods may be tied to their human capital. This accumulation of human capital can come from many sources, but education is the formal route in which to acquire human capital. This may be through investing in a general university degree, which could include significant opportunity costs of forgone income during years of study. If a producer is not from a farm background, or came from a farm where marketing was not a priority, then a university education may be the first source of exposure to marketing tools. Most university-level agriculture programs include a course on grain or livestock marketing. Additionally, producers could attempt to maintain, or improve, their understanding regarding grain and livestock markets through focused training from marketing seminars which are targeted to producers. By including all of these potential sources of human capital, this thesis removes some of the compounding effects of previous work to look for significance of human capital acquisition at a finer level.

1.4   Summary of Results

This thesis asks grain producers in the Canadian prairie about their use of marketing methods for wheat and canola; specifically forward contracts, futures markets, and options markets. Producers are asked about their annual use from the years 2010 through 2013, and their change in use after the opening of the Canadian wheat markets in August, 2012. This thesis finds that, as of 2014, forward contracting for both wheat and canola is the most frequently used forward marketing method. Use of futures markets for all crops is reported second most frequent, and

options markets are the least frequently used. These findings are similar to previous studies.
However, producers stated an increase in use of all marketing methods as of 2012, but use of
wheat forward contracting has the greatest reported increase, likely due to the opening of wheat
markets.

This thesis also attempted to find similar attributes among producers who increased their use of
marketing methods. Several personality and farm enterprise attributes are suggested as
indicators of increased marketing method adoption. In addition, previous experience with
marketing methods is identified as a significant factor for increased use of all marketing
methods.

1.5   Outline of Thesis

Bill C-18 is a significant policy change for the Canadian agricultural producer. For the first time
in almost 70 years, Canadian wheat is an unregulated market. The main questions of this thesis
are concerned with identifying if producers have made adjustments to their marketing, and if
those who have share similar characteristics.

This thesis used a survey to collect primary data from 295 producers in the Canadian prairie.
Questions were asked on changes in marketing methods as of 2012, marketing history,
personality characteristics, and farm demographics. The responses are analyzed using a probit
regression model to help understand if there are statistically significant similarities among
producers who have increased their forward marketing. These results will help to update the
known literature on producer marketing methods, help to identify if similar characteristics in
personality can help predict marketing behavior, and provide suggestions to those who are
interested in seeing producers succeed at price risk management.

Chapters 2 through 4 are organized to build understanding of the materials and methods used in this research before the regression results are discussed in Chapter 5. Chapter 2 provides a literature review of significant findings documented in the literature related to farm marketing decisions. Chapter 3 covers the methodology and design of the data collection process and general analysis of the data collected. Chapter 4 provides an explanation of the regression model and an overview of the regression results. The regression results are discussed in Chapter 5, before final conclusions and policy recommendations are presented in Chapter 6.

Chapter 2: Literature Review

2.1 Introduction

Attempts to understand the underlying influences of producers' marketing behavior have been an active area of research since the 1980s (Barkley and Schroeder, 1991; Davis et al., 2005; Goodwin and Schroeder, 1994; Just et al., 2002; Katchova and Miranda, 2004; Musser et al., 1996; Sartwelle et al., 2000; Schroeder et al., 1998; Shapiro and Brorsen, 1988; Tobin, 1958; Tomek, 1987; Townsend and Brorsen, 2000; Vergara et al., 2004; Willock et al., 1999; Wolf, 2012). In general, the acceptance of forward marketing through the use of forward contracts, futures markets, and options markets (together defined as forward marketing methods) has been viewed as analogous to the adoption of a new technology (Goodwin and Schroeder, 1994). Forward marketing methods have been touted as a method to reduce the variance in producer income, in comparison to selling only after harvest (Tomek, 1987). Despite the apparent benefits, previous work has found that not all producers use forward marketing methods (Davis et al., 2005; Goodwin and Schroeder, 1994; Musser et al., 1996; Sartwelle et al., 2000; Schroeder et al., 1998; Shapiro and Brorsen, 1988; Wolf, 2012). This thesis reflects and extends this body of research through the use of new explanatory variables in the context of Canadian prairie agriculture. This extends the current body of literature by focusing on a geographic area with a lack of prior research. This thesis also acts on the opportunity to ask producers about their marketing decisions in a newly deregulated market.

2.2 Risk Definitions

It is important to remember that the farm enterprise is a business, and that producers are attempting to maximize profits. However, profit maximization in agriculture has elements of timing and uncertainty that results in additional variation when compared to traditional concepts

(Lee et al., 1988). For this thesis, any potential variation that could lead to a decrease in profit will be referred to as a risk.

Three types of risks faced by Canadian producers include price risk, yield risk, and basis risk. Price risk is the chance of a decrease in the global commodity price of their crop between planting (usually in May) and the selling of their crop (usually after September). Commodity prices do fluctuate over time, and a price decrease during the growing season can result in a lower than expected profit (Lee et al., 1988). This is a concern as production income must provide for living expenses and operating costs, the latter of which can be substantial. Research has found that a majority of farmers expect to cover their operating costs with significant short term debt each year (Willock et al., 1999), and therefore the farm enterprise requires a minimum price in order to remain viable. If prices drop, the expected return could be less than the yearly outlay. Previous studies suggest that crop price variability is the producer's most important source of risk (Knight et al., 1989).

Yield risk refers to the farm's production uncertainty, or the year to year variation in total production. It is the chance that a producer will receive less physical product than expected due to some form of damage to their plants (Lee et al., 1988). Yield reduction can be due to weather such as heavy rain, excess heat, or hail. Yield can also be affected by roaming wildlife, pests, or diseases. In addition, other producers may unintentionally cause damage to a crop through accidental application of herbicide carried by the wind. Reduced yield results in producers receiving a lower than expected income, and previous studies have found that producers rank yield risk as their second highest source of risk (Knight et al., 1989). Yield risk can create issues for a producer attempting to hedge their production in the futures market. Concerns over lower

than expected yields could result in a producer holding futures contracts for an amount of crop greater than their actual production. This could result in additional costs to the producer.

Basis risk is the sum of the local transaction costs the producer bears in selling their production. Basis is the difference between the price a producer is offered at a local elevator and the price offered on futures markets (Lee et al., 1988). As the farmer often delivers to a local elevator who will export the production, and the elevator is a price taker on global markets, the basis is a cost to the producer that reflects additional costs faced by the elevator in elevating and transporting grain. The basis may also contain any fees the elevator expects to face from collection on defaulted contracts (Townsend and Brorsen, 2000), or expenses for hedging the grain, as the elevator assumes all price risk upon purchase (Barkley and Schroeder, 1991).

The basis also serves as a free market method to encourage or discourage grain deliveries to different locations. Should an elevator have previously contracted the desired amount of grain for the year, they can adjust their basis to be increasingly negative, effectively decreasing the amount producers would receive delivering to that specific elevator. This creates the potential for producers facing a global price that allows a profit, but receiving a local price that will result in a loss.

During the single desk powers of the CWB, a producer could participate in markets outside of Canada on paper, most likely in the US. If a producer uses markets in the US, they must use the local dollar (USD). This introduces an additional risk of exchange rate (FOREX risk) between the US dollar and Canadian dollar (CAD). This thesis focuses on producer marketing from 2010 through 2013, a period where the USD to CAD exchange rate varied from a low of 0.9428 to a

high of 1.0745 (Bank of Canada, 2016). The USD to CAD exchange rate from 2010 through

2013 is presented in Figure 2.1.

Figure 2.2.1: USD to CAD Exchange Rate (2010 through 2013)
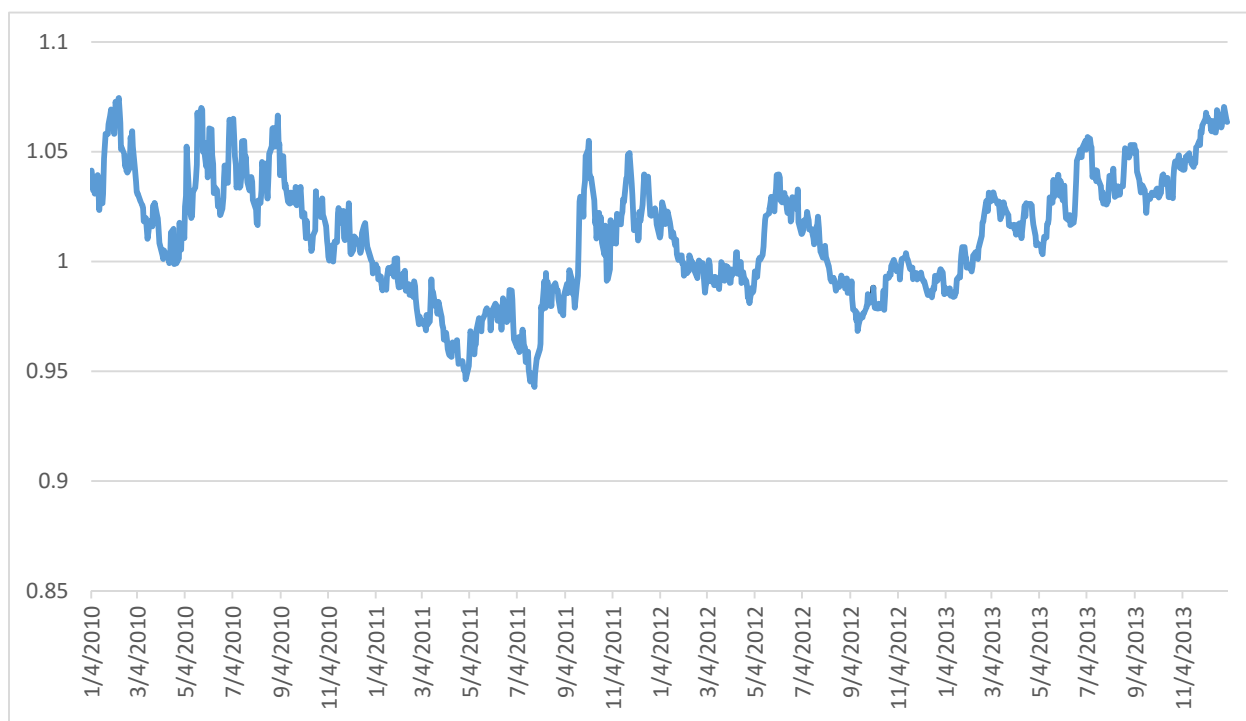
Source: (Bank of Canada, 2016)

2.3   Marketing Methods

Previous work has focused on three main methods of hedging price risks: the forward contract,

the futures market, and the options market (Davis et al., 2005; Goodwin and Schroeder, 1994;

Musser et al., 1996; Sartwelle et al., 2000; Schroeder et al., 1998; Shapiro and Brorsen, 1988;

Wolf, 2012). All of these methods are based on the same principle of the forward market: the

promise of a future delivery of a commodity (Bodie et al., 2008). While the use of forward

markets dates back to ancient Greece, modern forward contracts have become formal, and in

futures markets the agreements have become highly standardized exchange-traded securities

(Bodie et al., 2008). This section covers the potential advantages and costs of using these marketing methods.

The cash market, or spot market, is the daily pricing of agricultural commodities based off local sales. This price varies depending on both global and local market demand and supply availability. In years when global production is poor, supplies are low and prices increase due to futures markets. Inversely, in years when global production is high the prices decrease. When local production is poor the local supplies are low and prices increase due to elevator basis, and when local production is high these basis values decrease. This results in a timing element to sales, where some years the producer can receive more for their production. The buyers of farm commodities are unsure of the yearly supply as well, and are concerned that their costs could increase if supplies are lower than expected. It is the yield uncertainty and seasonality of agricultural markets that drives the existence of forward markets. Both the producer and the buyer can offset their risk if they enter into a contract for the sale of the commodity before it is harvested. Once the agreement is made, both parties are protected should the commodity price change in the future (Bodie et al., 2008).

2.3.1   Forward Contracts

The forward contract is a negotiated agreement between the producer and a buyer, usually a local elevator, in which both the buyer and seller agree on the delivery of an amount of grain on a specific date. Upon signing the contract, no money needs to immediately change hands. The contract is an agreement for a deferred-delivery sale (Bodie et al., 2008). Although there are potential costs in negotiation, forward contracts do not face many of the costs associated with using commodity markets (Lee et al., 1988). However, once a producer signs a contract, they are responsible for delivering the agreed upon amount or buying out the contract should they have

insufficient yield. This means a producer still faces yield risk through the use of a forward contract.

When a producer enters into a forward contract, they can choose to set a price immediately. This is normally done by setting a contract futures value, obtained by referencing a current futures market value, and agreeing to the basis currently offered by the elevator. This agreement protects the producer against price and basis risk as, should the global prices change between the signing of the contract and the delivery of the grain, the payment amounts have been specified previously.

However, variations of forward contracts exist that allow a producer to agree only to the current basis or the current futures value (Cargill Aghorizons Canada, 2016). If the producer chooses to only accept the current basis then they are protected from the risk of future changes to the basis. Producers who choose to set only the basis are still susceptible to the risk of changes in the futures markets, until they choose to set the futures market value at a later date. Some elevators allow a producer to agree only to the current futures value while not accepting the current basis value. This agreement protects the producer from the risk of a change in the futures market values but they remain at risk to the elevator changing the basis value.

2.3.2   Futures Markets

In order to facilitate larger volumes of global trading of commodities, formalized futures markets through exchanges have been established. These exchanges facilitate trades between both buyers and sellers and a clearinghouse which acts as the counterparty for both. The clearinghouse becomes the seller to the buyer, with the obligation to deliver the commodity, and the buyer to the seller with the obligation to pay for delivery. Through this, the clearinghouse holds a net

zero position in the market. This arrangement provides some counter-party risk protection, for if any trader is unable to fulfill the obligations of the futures contract, only the clearinghouse is at risk (Bodie et al., 2008).

The futures markets standardize the sale of commodities in all attributes but price, and allow for the global trade of structured contracts. Futures contracts specify that they are for a specific commodity with specific quality factors. In addition, these contracts have specific months that they expire. The trading of these contracts are handled on exchanges, which act as regional auction markets and allow for geographically distant buyers and sellers to interact. All futures contracts must be settled by expiration. Settlement can be through delivery or acceptance of the physical commodity or through the offsetting of the contract through a purchase of an equal and opposite contract. The purchase or sale of a futures contract is referred to as opening a position in the market. Offsetting of positions, also referred to as closing a position in the market, means that those who bought a contract must sell a contract before the first notice date, and that everyone who sold a contract must buy a contract before the first notice date (Bodie et al., 2008).

Participants in futures markets are not asked to pay the entirety of their position, but instead are asked to make a deposit equivalent to a percent of their position's value into a margin account. As changes in futures contract values are settled daily by the exchange, any gains are deposited into the margin account at the end of the day. Conversely, any losses are withdrawn from the account daily (Bodie et al., 2008). Should losses result in the value of the margin account being less than the required percent of the position's value, the trader is notified and required to have additional funds added to their margin account. This notification is known as a margin call. If sufficient funds are not added to the margin account, the position may be closed out by the exchange.

Maintaining the margin account is only one cost involved in using futures markets. There are also fees charged by brokers for every purchase or sale made on the exchange. However, this standardization of contract size, quality, and delivery dates allows for trading of commodities to be completed quickly, with minimal negotiation costs.

By selling a futures contract before selling the physical grain, producers enter into a short or sell position which can be used to hedge their price risk. This works because the futures price and cash market tend to move in the same direction by similar amounts (Lee et al., 1988). The valuation of a sell position is the difference between the value of the futures at the initial opening of the sell position (F_0) and the closing of the sell position (F_T) (Bodie et al., 2008). This valuation is shown in equation 2.1.

$$F_0 - F_T \qquad\qquad \textbf{(2.1)}$$

While the producer has an open sell position, three scenarios can occur:

1) *Cash prices decrease.* The physical production loses value in the cash market, as do the futures contracts on the futures market. As the open sell position is above the current futures price, the sell position gains value which is deposited into the margin account. When the physical production is priced in the cash market and the sell position is closed, the value of the physical production has decreased over time. However, the sell position has resulted in a net profit which offsets the lost value of the physical commodity in the cash market.

2) *Cash prices increase.* The physical production gains value in the cash market, as do the futures contracts on the futures market. However, the open sell position initial value is below the current futures value, resulting in losses which have been withdrawn from the

margin account. When the physical production is priced in the cash market and the sell

position is closed, the increased value of the cash market offsets the lost value in the

futures market.

3) *Cash prices stay the same*. The physical production has not changed in value. The

physical production is sold into the cash market. Similarly, the sell position's initial

value is equivalent to the final value and the margin account value is unchanged.

The following example in Table 2.1, adapted from Lee et al. (1988), shows a situation where an

open sell futures position in the Minneapolis wheat futures market is used subsidizes the falling

commodity price.

Table 2.1: Example Futures Hedge for Wheat

Date	Cash Market	Futures Market
May	Plant 200 acres of wheat with expected yield of 60 bu/acre	Sell 5000 bu December wheat contract for $6.10/bu = $30,500
October	Sell 7600 bu wheat for $5.50/bu = $41,800	Buy 5000 bu December wheat contract for $5.80 = $29,000
Futures Profit = 6.10 – 5.80 – $0.05 broker fees = $0.25 * 5000 = $1250 Total Return = $41,800 + $1250 = $43,050 / 7600 bu = $5.66/bu		

Source: (Lee et al., 1988)

Once a producer decides to sell their physical production through the cash market or a forward contract, the price of the physical production is no longer at risk. To continue to hold the sell position once the physical production has been priced would be speculatory. To offset the sell position a producer will need to buy equivalent futures contracts.

Yield risk provides additional concerns when a farmer tries to hedge a specific amount of their production due to the standardized size of futures contracts. Should yields be lower than expected, the standardized size results in a higher percent of crop hedged than expected. Likewise, a larger crop than expected can result in greater price risk exposure. Using values from Table 2.1, the original example has a producer use a futures market hedge for 42% of their crop. However, should the yields be half of what is expected, the futures market hedge now covers 83% of production.

Basis risk also remains when using futures markets. As seen in the above example, the final cash price was $0.30 below the futures market. This difference is the basis, and as the basis becomes more negative, the producer receives less in the cash market. Basis risk means that the price a producer receives will vary from the global markets (Lee et al., 1988). However, a producer may use a combination of forward contracting and futures markets to better hedge a price.

Consider the producer in the previous example. If they, after opening a short position in May, decided to check local elevator basis levels and found that the basis was $0.10 below the futures market. This would indicate to the producer that the elevator is looking to attract grain. The producer decides to make a forward contract for October delivery, but decides to only accept the basis. As shown in Table 2.2, when the producer sells their wheat in October, the contracted price would be $0.20 higher than in the cash market, resulting in greater overall profits.

Table 2.2: Example Futures Hedge for Wheat with Forward Contract (Basis Only)

Date	Cash Market	Forward Contract	Futures Market
May	Plant 200 acres of wheat with expected yield of 60 bu/acre	Contract 5,000 bu of wheat for October delivery, No futures, -$0.10 basis	Sell 5,000 bu December wheat contract for $6.10/bu = $30,500
October	Sell 2600 bu wheat for $5.50/bu = $14,300	Attach $5.80 wheat price to 5000 bu basis contract for price of $5.70 = $28,500	Buy 5000 bu December wheat contract for $5.80 = $29,000
	Futures Profit = 6.10 – 5.80 – $0.05 broker fees = $0.25 * 5,000 = $1,250 **Total Return = $14,300 + $28,500 + $1,250 = $44,050 / 7600 bu = $5.80/bu** **Table 2.1 Example Return: $43,050 / 7600 bu = $5.66/bu**		

Source: (Lee et al., 1988)

Futures markets are valued in specific currencies. Wheat futures markets exist for wheat of both Canadian and US origin, although it is clear that Canadian wheat futures markets are not being used as the markets are illiquid (Intercontinental Exchange, 2016b). Should a Canadian producer use US wheat futures markets, they are exposing themselves to FOREX risk. Should the producer face a margin call while participating in a foreign futures market, FOREX risk could result in their commitment being of a greater value in their local currency than expected.

Because of the margin account, use of futures contracts require producers to make the greatest cash outlay of all three marketing methods. This may make them inaccessible to farms who require all their cash for daily operations. The margin requirement may push producers who would use futures contracts into forward contracts.

2.3.3 *Options Markets*

Options are another tool that producers can use to hedge price risk. When a producer purchases an option they have the right, but not the obligation, to buy or sell a specific commodity futures contract. If they purchased a put option, they have the right but not the obligation to sell the underlying futures contract at a specified price. If they purchased a call option, they have the right but not the obligation to buy the underlying futures contract at a specified price. Choosing to use the right to buy or sell the underlying commodity futures is known as exercising an option. The specific price the option is exercised at is known as the strike price (Lee et al., 1988). Once an option is exercised, the producer no longer has the right to buy or sell the underlying commodity futures until another option is purchased.

The value of an option is known as a premium, and is based on two factors: the intrinsic value and time value. The intrinsic value is the value that can be obtained from exercising the option and is the difference between the underlying futures market and the strike price. A call option has intrinsic value when the underlying futures market price is above the strike price. Alternately, a put option has intrinsic value when the underlying futures market price is below the strike price. When an option has intrinsic value it is referred to as being in the money. If the underlying futures price is at the strike price, the option is referred to as being at the money. Finally, if an option has no intrinsic value and the underlying futures price is not at the strike price, the option is referred to as being out of the money (Bodie et al., 2008). The time value of

an option is based on the potential for an option to move into the money, which is dependent on the volatility of the commodity prices and the time left before the option expires. The time value can be measured by subtracting the intrinsic value of an option from the option premium. As the option gets closer to the expiry date, the time value decreases. At expiry, the only value remaining in an option is its intrinsic value (Bodie et al., 2008). Should the option have no intrinsic value at expiry, the option will expire worthless.

Besides being exercised and allowed to expire, options can also be offset. Should a producer have purchased an option that they wish to offset, they can sell an equivalent option. The result will be a cancelling net affect (Bodie et al., 2008).

Put options can be used by a producer to hedge price risk. The put option provides producers the right but not the obligation to sell the underlying futures contract at a strike price until the underlying futures contract expires. Should the cash market value of unpriced production decrease, resulting in the futures market value decreasing to below the strike price, the put option can be exercised to sell in the underlying futures market at the strike price. The difference between the strike price and the underlying futures market value, minus the option premium, can be used to offset the decrease in value of the physical production in the cash market.

For example, a producer may buy a put option for wheat with a $5.75 strike price for a premium of $0.15, including broker fees. If the producer expects the basis to be $0.10 at the time of sale, then the producer expects a minimum sale price of $5.50 for those hedged bushels (Lee et al., 1988).

$$Min\ Price = Strike\ Price - Basis - Option\ Premium = \$5.75 - \$0.10 - \$0.15 = \$5.50$$

Should the cash market decrease to $5.35, resulting in a similar futures market decrease, the futures market will be below the strike price of the put option. The put option now has an intrinsic value. At the expiry date, the intrinsic value of the put will be equal to the difference between the futures market value and the strike price.

$$Cash\ Market + Option\ Value = (\$5.35 - \$0.10) + (5.75 - 5.35 - 0.15) = \$5.50$$

Should the futures market price increase, the put option does not gain any intrinsic value and eventually expires worthless. However, in this scenario the cash market has increased with the futures market, and the unpriced physical production has gained value, resulting in the price of the option premium being the producer's cost (Lee et al., 1988).

2.4 Previous Research

This thesis found that the majority of research into producers' marketing choices is from the United States. Previous studies into producer use of forward marketing methods have explored the significance of a variety of demographic, financial, and institutional factors. These studies and their data sources are listed in Table 2.3. These studies consistently found that only a portion of producers used price hedging on their farm. Previous work has explored topics such as producer expectations, market data collection, and risk reduction in conjunction with government programs. However, consistent significant factors in the use of price hedging tools has mostly been found in farm demographic variables. These include producer age and experience, formal education, and farm debt levels.

This thesis includes many of the farm demographic variables used in previous literature as control variables. In order to extend previous research, this thesis focuses on the effects of

attributes internal to the producers: locus of control, risk attitude, and human capital through experience effects.

Table 2.3: Previous Research Details

Authors	Year Published	Total Sample	Data Source
Shapiro and Brorsen	1988	41	1985 Top Farmer Crop Workshop at Purdue University
Goodwin and Schroeder	1994	509	1991 members of the Kansas Farm Management Association
Musser, Patrick, and Eckman	1996	62	1993 Top Farmer Crop Workshop at Purdue University
Schroeder, Parcell, Kastens, and Dhuyvetter	1998	125	Anderson and Brorsen 1996 / Agricultural Land Value Conference 1996 and Cattle Profit Conference 1997
Sartwelle, O'Brien, Tierney, and Eggers	2000	351	Kansas, Iowa, and Texas agricultural producers through a mix of random mail surveys, agricultural magazine subscribers, and marketing program graduates (1997/1998)
Davis, Patrick, Coble, Knight, & Baquet	2005	1266	National Agricultural Statistics Service 1999
Wolf	2012	458 / 225	Two surveys of Michigan Department of Agriculture list of dairy operations (1999/2011)

2.5 Main Topics of Interest

2.5.1 Locus of Control

Interest in locus of control, or an individual's perception of their influence on a situation (Rotter, 1966), is prevalent in management research. As defined previously, all individuals hold beliefs as to the extent that their actions influence a situation and the eventual outcome of events. These beliefs are labeled as either internal or external. An individual with an internal locus of control perceives the outcome of events to be determined by their own personal effort. Those with an external locus of control perceive outcomes to either be set and unchangeable, or under the control of other powerful individuals or institutions. Mueller and Thomas (2000) surveyed 3rd

and 4th year business students from 25 universities over 15 countries and found that internal locus of control had a significant positive correlation with individualism and innovativeness, and a significant negative correlation with uncertainty avoidance. Research results on this aspect of producers have been varied. Potential reasons for variation are noted in previous research, which has found an individual's locus of control to be multi-dimensional, context specific, and subject to individual aspirations (Ajzen, 1991; Hines et al., 1986; Lefcourt and Wine, 1969; Sia et al., 1985). Kaine et al. (2004) surveyed primary producers in Australia and found that producers with a strong internal locus were more likely to adopt a prospective farm strategy, while those producers with an external locus were more likely to plan defensively.

Begley and Boyd (1987) looked for links between the financial performance of firms and the psychological attributes of the current firm managers, with distinction made between entrepreneurial founders and managers who had replaced original entrepreneurs. Although there was no evidence that founders had a greater locus of control than their counterparts, their findings did suggest that those with an internal locus maintained lower liquidity levels than those with an external locus (Begly and Boyd, 1987). This may suggest that an internal locus extends to belief of control over liabilities, or that those with an internal locus of control are more likely to commit financial assets to projects.

Although often touted as a modifier of general expectancies, research has suggested that locus of control may not be a dominant force in decision making. There is evidence that locus of control can be overcome by countervailing influences, often of the economic manner. McNairn and Mitchell (1992) studied the implementation of conservation tillage in areas at risk of soil erosion. Although there is strong reasons for the implementation, specifically that the new tillage methods would counteract erosion risk, they still found many producers were unwilling to switch. These

results were found despite the fact that these producers were internally motivated and responded that the soil loss was more serious than the economic consequences. The authors' theorize that the producers' personal risks associated with the new tillage methods were greater than the producers' risk threshold. Although the potential soil loss was the producers' greatest stated threat, the risk of immediate failure from potential yield losses involved with new tillage resulted in any change being economically prohibitive.

2.5.2 Risk Attitude

While a producer faces external risks from nature and fluctuations in global markets (Newbery and Stiglitz, 1981), they also face some risk in the initial adoption of forward marketing methods, as they often impose additional costs with no guarantee they will be needed. A producer would need to believe that the associated costs are less than the utility they get from being protected should the price move against them. Therefore, a producer's risk attitude should be a factor in their decision to use forward marketing methods.

Risk attitude studies have been unclear on producers' risk tolerance as a general group. The assumption is that, as the producer has founded a farm business and is therefore an entrepreneur, that they are generally more accepting of risk. Research by Guerin and Guerin (1994) suggested that farmers are risk averse with respect to unproven ideas, which results in slow adoption rates. As farm-based hedging of commodities may be considered a fairly new innovation by the industry, this hesitation to adopt may account for findings in other research that less than half of producers have adopted financial market tools (Davis et al., 2005; Goodwin and Schroeder, 1994; Musser et al., 1996).

Work by Goodwin and Schroeder (1994) suggests that producers may see risk in forward marketing, as they found a significant relationship between producers with a stated preference for business risk and the adoption of forward marketing methods. However, other work has found that producers perceive forward contracts as risk decreasing (Musser et al., 1996; Shapiro and Brorsen, 1988). The reason for this variation is unclear, as general theory would suggest that the ability to forward price production at an acceptable return should reduce price risk; however, as forward markets trade price risk for yield risk, then a producer's perception of the risks involved in forward marketing could vary depending on which risk source they find most concerning. A producer may consider a risk source less concerning if they feel they have more control over the outcome. Therefore, a producer's choice of forward marketing method could be dependent on both their individual risk attitude and locus of control.

Surveys have been conducted with producers, entrepreneurs, and the general public on the effect of risk aversion on a variety of topics. Research has found that those with a generally risk averse personality will tend to minimize their debt loads (Driver and Onwons, 1986). However, surveys by Willock et al. (1999) found that producers consistently expressed belief that carrying a debt load was required for a successful farming enterprise. This implies that producers tend to be more risk tolerant than the general population, an assumption that is consistent with the findings of other studies of entrepreneurs (Begly and Boyd, 1987; Brockhaus, 1980).

2.5.3   *Previous Marketing Experience*

Previous research has found that producers' stated comfort levels with marketing through forward contracts and futures and options markets have significant marginal effects in producers' marketing decisions (Davis et al., 2005; Vergara et al., 2004). In both studies, producers were asked to indicate how comfortable they were with their knowledge of forward contracting tools.

Comfort was ranked on Likert scale from 1 to 5, with 1 being not comfortable and 5 being very comfortable.

Vergara et al. (2004) ran logit model regressions for marginal effects on groups of respondents who were sorted by their primary marketing method. Producers' knowledge of marketing methods was significantly related to their choice of forward pricing techniques, as opposed to marketing alternatives. Producers with greater knowledge of forward contracts were found to be significantly more likely to use forward contracts as their primary marketing. This finding was a statistically significant positive effect at the 1% level. Similarly, those producers who stated greater knowledge of futures and options contracts were significantly more likely to use futures and options markets as their primary marketing method. Again, this relationship was a significant positive effect at the 1% level. A significant negative relationship was also found between knowledge of forward contracts and use of cash contracts as a primary marketing method. Those producers who reported greater knowledge of forward contracts were significantly less likely to primarily market through cash markets. Again, this relationship was found significant at the 1% level.

Davis et al. (2005) ran Heckman's two-step regressions for probability of forward pricing grain on groups of producers who stated use of forward contracts, those who stated taking a direct position in the futures or options markets, and those who used forward contracts or futures markets. They found that, for producers who reported marketing using forward contracts, their stated comfort in using forward contracts was positive and significant at the 1% level for their marketing of both corn and soybeans. Additionally, forward contracting producers stated a lack of comfort in using futures and options markets which was found significant at the 1% level for their marketing of both corn and soybeans. For those producers who took direct positions in the

35

futures and options markets, their comfort level with futures markets was positive and significant at the 1% level in their marketing of both corn and soybeans. Their comfort with forward contracts was negative and significant at the 10% level in their marketing of soybeans. When both groups were combined, only stated comfort with forward contracts was found to have a marginal effect, which was positive and significant at the 1% level for marketing both corn and soybeans.

These results indicate that producers who feel more comfortable with a specific marketing method tend to favor the method when making marketing decisions. In addition, when users of all forward contracts are subsampled from the greater population, producers in the subsample who were comfortable with futures and options markets were less likely to use forward contracts than their peers. Finally, among those producers who mainly used cash markets, probability of use was decreased among those with increased comfort in using forward contracts. These results suggest that a producer modifies their marketing decisions as they gain comfort and experience with forward marketing methods.

2.6   Significant Topics from Previous Research

The studies listed in Table 2.2 investigated many firm and personal characteristics, some of which have been found to significantly influence marketing behavior. These previously significant findings have been included as variables in this thesis to allow comparisons to previous work.

2.6.1   Managerial Experience

It is assumed that a producer must sell at least a portion of their production every year in order to maintain cash flow on the farm, and therefore they will be accumulating marketing experience

the longer they are in the position of farm manager. With wheat, western Canadian producers have had access to futures and options markets in the United States. Under the Canadian Wheat Board Act, the CWB was only required to sell for prices it felt was reasonable (CIGI, 1993). Although this did not guarantee that the price offered to the farm would follow futures values, it appears the CWB offering prices did track the Minneapolis market (Minneapolis Grain Exchange, 2016a).

However, the CWB did not have exclusive right to all crops. There has been a Canadian futures market for canola (previously rapeseed) since 1963 (Alberta Agriculture and Rural Development, 2006), which Canadian elevators have used as a reference for local pricing. This has provided producers an opportunity to develop transferable skills for marketing wheat through the marketing of their canola crop using futures markets. In addition, canola options markets have been operating since 1991 (Alberta Agriculture and Rural Development, 2006).

Previous research has defined experience as the total years a producer has been the primary manager of the farm at the time of being surveyed (Goodwin and Schroeder, 1994; Musser et al., 1996; Shapiro and Brorsen, 1988). Some of the studies used age as a proxy for experience (Davis et al., 2005; Katchova and Miranda, 2004; Musser et al., 1996; Vergara et al., 2004; Wolf, 2012). Shapiro and Brorsen (1988) found a significant negative relationship between producers' experience and their use of futures markets. Goodwin and Schroeder (1994) found a significant negative relationship between experience and the adoption of any forward marketing. Musser, Patrick, and Eckman (1996) found a significant negative relationship between age and the percent of crop forward marketed. Sartwelle et al. (2000) found a significant negative relationship between producer experience and the use of the futures market. Vergara et al. (2004) found a significant and negative relationship between age and futures market use and

37

options market use. Davis et al. (2005) found a significant negative relationship between age and the probability of forward marketing soybeans using forward contracts, futures markets, and options markets. Wolf (2012) found a significant negative relationship with respect to age and the use of forward marketing to manage input price risk among dairy farmers. The only positive relationship was found by Katchova and Miranda (2004), who found a positive significant relationship between soybean producers' age and their use of forward contracts.

The majority of previous work suggests that as producers operate longer, they forward market less. Logically, the more years a producer is managing their farm, the more experience they should have, and more comfort with, the marketing of their production. However, those producers who have been farm managers for extended periods have had opportunities to pay down their debts, and may be sitting in stronger financial positions. Producers with strong financial positions may not feel the need to forward market, and can afford to wait for favorable pricing (Shapiro and Brorsen, 1988). Additionally, some producers may have simply avoided using forward marketing methods and developed habits that they are unwilling to change (Davis et al., 2005).

2.6.2   Formal Education

It is assumed that forward contracts, futures markets, and options markets are more complex than the cash market. Education is theorized to better equip individuals to utilize these marketing methods effectively. Previous literature has not found consistent results with respect to education (Goodwin and Schroeder, 1994; Katchova and Miranda, 2004; Musser et al., 1996; Shapiro and Brorsen, 1988). Several results have suggested that additional education decreases use of some marketing methods. Shapiro and Brorsen (1988) found a significant negative relationship between producers' total years of education and the use of the futures market to

38

hedge. Davis et al. (2005) also found a significant negative relationship for soybean producers between having post-secondary education and the probability of using forward contracts, the futures market, or the options market.

However, the bulk of recent work has suggested a positive influence of education on marketing method adoption. Goodwin & Schroeder (1994) found a significant positive relationship between years of formal education and the probability of forward marketing adoption. Musser, Patrick, and Eckman (1996) found a significant positive relationship between years of formal education and the total percent of corn that was marketed through forward marketing methods. Katchova and Miranda (2004) found a positive significant relationship between soybean producers' education and their use of forward contracts.

It is possible that producers have increased their use of marketing methods over time. Two studies surveyed producers at the same conference in different years (1985 and 1993) and found significantly different results of education on marketing method use (Musser et al., 1996; Shapiro and Brorsen, 1988). Given the eight year time span, experiences by producers may have diffused to their peers. Another potential possibility is this extra time gave more producers the opportunity to try and use these methods themselves.

Potential discrepancies could come from sampling methods. Two studies used data collected in 1999 by the National Agricultural Statistics Service of the US Department of Agriculture (Davis et al., 2005; Katchova and Miranda, 2004). Katchova and Miranda used national data and found results that suggest a positive relationship between education and marketing method adoption. However, Davis et al. limited the total data used in their study to only include the states of

Indiana, Mississippi, and Nebraska. Their research results suggest a negative relationship between education and marketing method adoption.

2.6.3 Supplementary Education

The internet provides a variety of alternative methods to access information and education. Information on how to use the futures and options markets is available online through websites and video streams. In addition, the Canadian financial sector is often at producer conferences to sell services on how to use futures and options markets to manage farm marketing risks. Most farming conferences include several sessions to help producers become familiar with terminology and requirements of maintaining a brokerage account. These marketing specific educational resources provide a targeted approach to building human capital to producers in an alternative form than formal education. Goodwin and Schroeder (1994) found a significant positive relationship between participation in marketing education programs and forward marketing methods.

2.6.4 Marketing Advisor

Understanding marketing methods requires a certain level of human capital through education and experience. Market advisory services provide an option for producers to purchase (or rent) the time of an individual with the necessary human capital. Therefore, a producer who uses a marketing advisor should have a higher probability of using forward marketing methods.

Producers can also face several logistical barriers in using forward marketing methods. Marketing requires a producer's time, which is time they cannot spend on field work. A marketing advisor may provide benefits from labour distribution, if they reduce the producer's time requirement for the farm's marketing.

Katchova and Miranda (2004) found a significant positive relationship between producers' use of forward contracts and the use of advisory services, with respect to corn and soybeans. Davis et al. (2005) found significant positive relationships between the use of a marketing advisor and the probability of a producer forward marketing corn and soybean using forward contracts, futures markets, or options markets. In addition, they found a significant positive relationship between advisor use and the percent of expected production that would be forward priced.

2.6.5 *Debt to Asset Levels*

All business involves some risk. However, existing debt can make it difficult for a business to carry risk without risking insolvency. Previous literature has measured debt-to-asset ratio to compare enterprise financial leverage (Goodwin and Schroeder, 1994; Katchova and Miranda, 2004; Musser et al., 1996). The assumption is that as producers increase their financial leverage, the use of forward marketing will increase in order to mitigate risks to income that could result in insolvency. Goodwin and Schroeder (1994) found a significant positive relationship between increased leverage and the probability of adoption of forward marketing methods. Musser, Patrick, and Eckman (1996) found a significant positive relationship between financial leverage and the maximum percent of production marketed with respect to soybeans. Katchova and Miranda (2004) found a significant positive relationship between producers' debt to asset ratio and the use of forward contracts with respect to corn.

Alternatively, hedged producers may have more access to credit if they are considered to be lower risk clients for lenders (Heifner, 1972). This would allow those producers who hedge to better leverage their enterprises, resulting in greater financial flexibility over those producers who chose not to hedge. Previous research has found mixed results, both suggesting that lenders

are more likely to grant loans to producers who hedge (Harris and Baker, 1981; Powers, 1968), and finding that hedging makes no difference to lenders (van Blokland, 1974).

Knight et al. (1989) looked at debt in a slightly different manner. Their work analyzed the effect that debt levels and lender advice had on the use of forward contracts. Use of forward contracts was regressed against farm equity, with the base case of a producer with 0-10% equity in the farm enterprise. Farm equity was not found to be significant; however, lender policy was found to be significant in forward contract adoption. Knight et al. (1989) found a significant positive relationship between forward contract use and the lender recommending, or even discussing, the use of forward contracts.

2.6.6 Total Production (Proxy: Farm Size)

Farm size, or the total producing landmass operated by the farm enterprise, is the simplest measurement for estimating a farm's maximum production potential. It is a logical assumption that as farmed landmass increases, the total production that must be marketed will also increase. In addition, both fixed and variable costs of the farm enterprise should also increase. These assumptions are the base of an expectation that larger farms will be more active in their marketing to ensure cash flow requirements are met. There is an expectation that larger farms may forward contract simply to ensure income by specific dates.

Yearly production levels of land vary and records are often estimates; therefore, total producer acreage is used as a proxy. Previous research has found mostly positive relationships between total acreage and forward marketing adoption. Shapiro and Brorsen (1988) found a positive significant relationship between acres farmed and use of futures markets. Goodwin and Schroeder (1994) found a significant positive relationship between total farm acres and

probability of adopting forward marketing methods. Crop specific regressions revealed positive significant relationships for wheat, corn, and soybean, and a significant negative relationship with cattle. Sartwelle et al. (2000) found a significant positive relationship between crop acreage and the use of forward contracts. Davis et al. (2005) found significant positive relationships between total crop acres and the percent of expected production forward priced through forward contracts for corn and soybeans. A significant positive relationship was also found between crop acres and the percent of expected soybean production forward priced in the futures market or options market. The only conflicting result was found by Musser, Patrick, and Eckman (1996) who used gross income as a proxy for farm size and found a significant negative relationship with respect to the total percent of corn forward marketed. However, their finding used data from 1993, a year when futures prices steadily decreased until late June when they quickly increased. For this specific year, the gross income of a producer who held their production unhedged until after June could be greater than a producer who hedged earlier.

2.6.7 *Crop Insurance Use*

Crop insurance, in general, exists as a method to mitigate a large proportion of potential risk in exchange for an insurance premium. As previously described, producers face yield risk every year. Should a crop grow with yields below anticipated levels, a producer would be facing lower than expected income. Crop insurance reduces the severity of the financial losses taken by the farm if yields are below anticipated levels. Therefore, crop insurance use helps offset yield risks and could affect producers' decisions when forward marketing. Wang et al. (1998) found a positive correlation between the use of futures and options markets and producer's choice of premiums. Goodwin and Schroeder (1994) found a significant positive relationship between the purchase of crop insurance and the probability of adopting all types of forward marketing

methods. Sartwelle et al. (2000) found a significant positive relationship between use of crop insurance and the use of forward contracts, as well as a positive relationship between the use of crop insurance and the use of futures contracts. Davis et al. (2005) found a significant positive relationship between the use of crop insurance and the percent of expected production of corn that was forward priced through futures markets or options market.

2.6.8   Soil Zone

The Canadian prairie region is made up of soils of the Chernozemic Order. These soils are classified by the colouration of the surface layer using the Munsell colour system (University of Saskatchewan Department of Soil Science, 2015). Two types of soils are included in this classification. The areas of native grassland are classified as brown, dark brown, or black. The transitional areas between grassland and forested area are classified as gray or dark gray. Those soils with darker color classification have greater mean annual precipitation, higher organic matter, and higher yield potential (Pennock et al., 2011). This results in producers within the same province facing very different growing conditions, and varying levels of yield risk.

2.6.9   Farm Capitalization (Proxy: Total On-farm Storage)

Modern farming in the Canadian prairie has the majority of harvested grain stored on farm in large, bolted, galvanized-steel bins (White et al., 1999). These bins are often costly on their own, and often contain apparatus within to force air through the grain to prevent spoilage or contamination of the contents (Jayas and White, 2003). However, this storage has been required due to limited opportunities to deliver to commercial storage facilities. Other storage methods are available such as grain bags or piling production on the ground. Steel bins have proved popular as they provide a high measure of protection from the elements and wildlife (White et al., 1999).

44

Besides the cost of the actual bin itself, there are costs in the preparation of the location required before their placement, and in the transportation of the bin to the farm site. The choice to erect on farm storage also represents an opportunity cost, as the funds invested in the bins could have been used elsewhere off the farm. Therefore, these bins represent a willingness of the producer to make significant investment in the farm enterprise.

Previous literature has not found any significant relationship between on farm storage and forward marketing use. However, Sartwelle et al. (2000) found a significant negative relationship between commercial storage and futures market use for producers in the southern states.

2.6.10 Hired Labour – Full Time Workers

As farm equipment grows in size, it becomes easier for producers to substitute farm capital for labour. However, a producer's time is finite and the task of marketing production does require some market research and planning. Someone must be responsible for checking the futures markets to get an idea of the current price of their production, and for calling local delivery points to get cash prices and basis values included. They may also be interested in calculating the minimum price that covers their costs of production and provides profit. Finally, someone is responsible for ensuring that the physical production is transported to the delivery point.

The process of farm marketing can be quite time consuming. Given that a farmer's time for activities beyond the actual act of farming decreases as their land base increases, it is possible that a producer with enough land could end up with no time for marketing during the growing season. Additional on-farm labour provides benefits from division of labour. This labour is a

valuable asset, represented in additional wage outlay by the farm enterprise. However, this allows the producer to keep production on track, freeing a producer's time to focus on marketing.

2.7 Conclusion

Like previous literature, this thesis will focus on producers' use of forward contracts, futures markets, and options markets. This thesis also uses control variables for producer attributes and farm enterprise attributes that have been suggested as significant in previous research.

The main difference for this thesis is the regional location of the Canadian prairie, an area where no research on producers' use of marketing methods could be found. The reason for this lack of research could be due to the second distinctive characteristic of this thesis: that policy change effective August 2012 has changed the wheat market into an open market. This research asks producers about their marketing choices in years from 2010 through 2013 in an attempt to identify how a significant market change affects producer marketing decisions.

This thesis also focuses heavily on three producer attributes and their effect on farm marketing decisions. Previous literature on locus of control and its impact on farm marketing decisions is limited, and this thesis aims to expand this area of research. Risk attitude has been covered in past literature, but this thesis differentiates the measurement by framing the risk measurement using specific context. A general risk attitude scale is replaced with three contextual risk measurements: risk tolerance for marketing wheat, for marketing canola, and for general business risks. Human capital effects through previous experience with marketing methods are also explored in this thesis. These effects are also made crop specific for forward contracting as it is consistently found in previous literature to be the prominent marketing method used by

producers. This specificity is used to explore the potential of human capital transfer between

marketing different crop types.

Chapter 3: Survey Data and Descriptive Statistics

3.1   Introduction

This thesis is concerned with changes in producers' marketing behavior due to government

policy changes in 2011.   This policy change removed the CWB as a single desk marketer of

wheat produced in Canada's prairie region. As of August 2012, all Canadian wheat can be

marketed by Canadian producers (Parliament of Canada, 2011). This thesis asked producers

about their marketing decisions for wheat and canola from 2010 through 2013, with an intent to

discover:

1. Have producers in the Canadian prairie changed their use of forward contracts since the
   2012 marketing year?
2. Have producers in the Canadian prairie changed their use of futures and options markets
   since the 2012 marketing year?
3. Can common attributes be identified among the producers who chose to increase use of
   forward marketing methods?

The data used in this thesis was generated through a producer survey consisting of 46 questions.

The majority of questions were based on or adapted from previous research in the United States.

However, some new questions were added to facilitate the uniqueness of the Canadian

geography and to explore the entrepreneurial aspects of the producer.

This chapter will start by explaining the survey design and point out potential sources of bias.

Details are also given on the design of several multi-item measurement scales for locus of

control and risk attitude. Next, the requirements for a response to be considered complete and

included in this research are explained, and total inclusion rates are given. Finally, a summary of

the responses are listed, and comparisons to the Agricultural Census of 2011 from Statistics Canada are made to check if the sample is representative.

3.2 Survey Design

This thesis collected information from producers on their marketing choices from the years 2010 through to 2013. Questions were also asked about the farm enterprise and about the producers' personal characteristics. The full survey can be found in Appendix 1.

The survey was designed to be administered over the internet. Earlier versions of the survey were pretested by faculty and producers who offered suggestions on question relevance and the clarification of wording. Final survey completion time was estimated at a maximum of 30 minutes, as the inclusion of several questions were dependent on previous responses. All questions had a "refuse to answer" option added as a protest response in order to maximize useful data.

The administration of this survey[1] was contracted to the third party survey company Ipsos Agriculture and Animal Health (hereafter Ipsos). Ipsos is a global market research company who maintains a list of willing survey participants. Ipsos was hired to convert the paper survey into a web based survey, screen participants to meet pre-selection criteria, and distribute a $20 payment to completed survey respondents as an incentive. In order to participate, producers first had to provide consent to having their information used in research, indicate that they grew more than 1000 combined acres of wheat and canola, and that they were the person with overall or joint responsibility of marketing their wheat and canola.

---

[1] This survey received ethics approval for research involving human participants before being administered. Ethics approval reference number BEH 14-47 at the University of Saskatchewan.

A total of four measurement scales were developed for this research. For risk attitude, three scales were developed: two for assessing the producers' perceived risk associated with the sale of wheat and canola, and a third for assessing the producers' perceived risk associated with general decisions for the farm enterprise. The fourth scale was a measure of producers' locus of control.

Several questions were grouped together in order to develop scales to assess producers' risk attitudes and locus of control. Previous work has shown that the framing of questions is important as risk attitudes are based in perception (Tversky and Kahneman, 1981). Risk attitude questions were adapted from Pennings and Garcia (2001). Locus of control questions were adopted from Mueller and Thomas (2000). All scales were comprised of responses to several questions with 7-point Likert scale responses. For risk attitude, greater values indicate greater risk tolerance, and lower values indicate less risk tolerance. For locus of control, lower values indicate an external locus of control and greater values indicate an internal locus of control. Producers were asked nine risk attitude questions and nine locus of control questions. The mean of producers' responses were used to rank them on their internal bias. Each respondent received questions on locus of control and risk attitude in a random order.

3.3   Limitations of Thesis Scope

This thesis looks at the topic of producer use of marketing methods and makes comparisons to previous studies of marketing by producers in the United States of America. However, it should also be noted that research on this subject has been effected by changes in technology and policy. This section recognizes some of the changes that have undoubtedly had an effect on this thesis's results in comparison to previous research, but which were not directly addressed in the research.

The body of research on producer marketing method use cited in this thesis starts in 1987. Since this time, there have been fundamental changes in how futures markets are traded and how producers may participate. Once only accessible through individual brokers, electronic trading of US wheat futures began as of 2006 (CME Group, 2016b; Minneapolis Grain Exchange, 2016b). Electronic trading of commodity futures markets has greatly increased access through online applications. This move to electronic trading has also led to consolidation. Currently, all US wheat futures are traded on the CME Group trading platform.

There is also a fundamental difference between this thesis's data on wheat marketing choice and previous research into producer marketing method use. This thesis focuses on a time period that includes the removal of the CWB single desk marketing powers, a change in policy which opened the wheat market for producers in the Canadian prairie. Previous literature from the US does not incorporate such a dramatic policy change, and there is the possibility that this change has introduced unknown effects that are uncaptured in this analysis.

Also not addressed in this thesis is the differences between the US and Canadian agricultural support programs, and how the possible effects from these policies could differentiate farm marketing behavior between the two countries. For the period of 2010 through 2013, the US farm bill in effect was the Food, Conservation, and Energy Act of 2008. This provided direct payments to farmers regardless if they were needed, counter-cyclical payments to farmers when commodity prices dropped to target levels, and conservation payments for leaving land idle (US Senate, 2008). The producer in the Canadian prairie did not have access to similar supports.

3.4 Possible Sources of Bias

The thesis has five identified potential sources of bias due to the chosen sampling method, minimum farm size, access to the internet, social desirability bias due to fear of nonpayment, and method bias due to the self-report administration of this survey.

As Ipsos was contracted to conduct the survey, there is a potential sampling bias. The survey sample is selected from contacts known to Ipsos rather than a truly random selection. To be included in the research, the producer would have had to indicate that they wished to be surveyed by Ipsos, therefore a sampling bias is introduced as there is a similarity in the willingness to respond in all participants.

The decision was made to impose a minimum size restriction on all respondents, requiring any producer surveyed to have at least 1000 acres of crop land. Previous research has suggested that larger farms are more likely to use futures and options (Davis et al., 2005; Goodwin and Schroeder, 1994; Sartwelle et al., 2000; Shapiro and Brorsen, 1988). This lower limit on farm size was set to maximize the number of futures and options using producers in the sample. Given the area of interest, expected yields of wheat and canola are respectively 50 bushels and 40 bushels (0.9 tonnes) per acre. Land requirements per contract are calculated below.

$$Canadian\ Milling\ Wheat\ Futures = \frac{3674bu}{50bu/ac} = 73\ acres\ per\ contract$$

Source: (Intercontinental Exchange, 2013)

$$US\ Wheat\ Futures = \frac{5000bu}{50bu/ac} = 100\ acres\ per\ contract$$

Source: (CME Group, 2016a, 2016c; Minneapolis Grain Exchange, 2015)

$$Canola\ Futures = \frac{20\ tonnes}{0.9\ tonnes/ac} = 22\ acres\ per\ contract$$

Source: (Intercontinental Exchange, 2015)

While it is clear that these contracts could be utilized with minimal farm land, Figure 3.1 illustrates that within the sample, the trend is for greater utilization of marketing methods by larger farms. Figure 3.1 also highlights the stated low usage rate of futures and options by all farm sizes in this thesis. Moving below 1000 acres could have potentially included producers who do not use options at all, and therefore would have increased research costs while providing data less applicable to this thesis.

Figure 3.1: Percent of Producers Using Marketing Methods by Operated Farm Acres
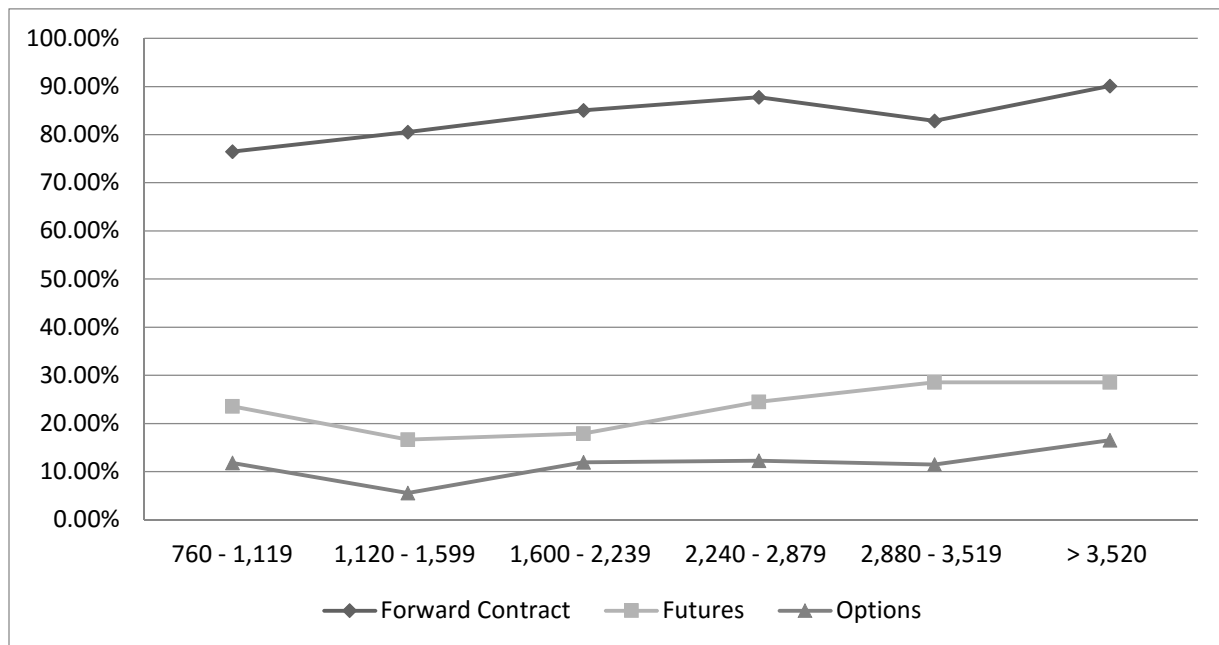
Another potential source of bias in the sample comes from the administration of the survey over the internet. This survey has only been answered by those who are geographically able to receive internet and who decide to subscribe to such a service. There was some concern that the

survey method may skew the sample to be younger than the average Canadian producer.

Previous research by Statistics Canada found that household internet access was more likely if

the age of the head of the household was less than 55-64, and less likely if their age was greater

(Singh, 2004). However, the age of producers surveyed by this thesis ranged from 19 to 77, with

the average age of producers being 53.86 and a median age of 55. This is comparable to the

2011 Census of Agriculture which found the average age of Canadian producers was 54 years of

age (Statistics Canada, 2011b).

All producers were offered a $20.00 incentive, to be paid on completion of the survey. This

creates the potential for social desirability bias, or a fear of non-payment by respondents that

could result in respondents changing their answers to what they thought the researcher wanted to

hear. There are several recommendations on how to prevent or reduce social desirability bias

(Nederhof, 1985). This thesis attempted to mitigate this bias through self-administration of the

survey, payments being made to producers through the market research firm Ipsos, and by

keeping the identities of producers anonymous. The producers were assured of their anonymity

from the researchers and payment upon completion no matter the responses.

Data for this thesis was collected directly from producers through an online survey. This method

results in respondents reading the questions and providing a response themselves without

researcher interference or interaction. There is potential method bias from the way this survey

was administered, as there is no context to the producer's response (Nederhof, 1985). As such,

responses in self-reported surveys may be exaggerated if the respondent feels strongly about the

topic, or alternatively minimized if the respondent feels the need to under-state their problems.

3.5 Data Formatting and Cleaning

While there was a total of 516 responses collected from the survey, some responses appeared to show signs of minimal effort or limited memory. Two responses showed strong indications of survey satisficing (Malhotra, 2008) as one respondent refused to answer any questions, while another respondent straight lined all Likert scale answers for all risk and locus of control questions. These responses had nothing to add to the results and were excluded from the sample.

Four respondents refused to answer questions used as the dependent variable of the probit regressions in Chapter 4. With no dependent variables to work with, these responses were excluded from the sample.

This survey also included questions on a number of personality attributes and farm characteristics which make up the independent variables of this research. These questions are divided into areas of interest of this thesis and control variables. Two of the variables of interest (locus of control and risk attitude) use responses to multiple questions to estimate values, and non-response to any of the required questions led to the response being excluded from the sample.

Finally, a number of control variables were included. These were variables that had been found significant in previous research (Barkley and Schroeder, 1991; Davis et al., 2005; Goodwin and Schroeder, 1994; Just et al., 2002; Katchova and Miranda, 2004; Musser et al., 1996; Schroeder et al., 1998; Shapiro and Brorsen, 1988; Tomek, 1987; Townsend and Brorsen, 2000; Vergara et al., 2004; Willock et al., 1999; Wolf, 2012). These variables are total years as primary farm manager, level of formal education, total crop acres, use of crop insurance, soil zone of farm, total on farm storage, total yearly hours spent at marketing workshops, total paid marketing

workshops attended, use of a marketing advisor, farm debt level as a ratio, and total on farm labour employed. Refusal to answer these questions also led to exclusion.

It should be noted that if a respondent refused to answer one question, they often refused to answer others. Total refusals per variable are listed in Table 3.1 below.

Table 3.1: Total Response Refusals by Variable

Independent Variables of Interest	Total Refusals
Locus of Control	9
Risk Attitude	26
Yearly forward contracting use	57
Yearly futures market use	0
Yearly options market use	20
Control Variables	
Total years being primary manager of a farm	5
Level of formal education completed	10
Total crop acres farmed	8
Yearly use of crop insurance	0
Soil zone farmed	0
Total Farm Storage for grain	35
Average yearly marketing workshop attendance hours	25
Use of a marketing advisor	0
Farm leverage (general debt to asset ratio)	0
Total on farm labour count	9

These requirements meant that of the original 516 completed surveys, a total of 295, or 57% were retained.

Respondents were also asked about which soil zones they farmed crops in. The option was given for reporting more than one soil zone, and 37 respondents reported farming in multiple zones. For simplicity, only the first response was retained for use in summary statistics and regressions. An 'unknown' option was also provided in case a producer was unsure of their farm's soil characteristics. This was considered a better option than forcing them to provide a false response or choosing the protest option.

3.6 Scale Reliability and Validity

A producers' locus of control and risk attitude are represented on a Likert scale, based on their responses to a series of questions. As the scales in this research consist of multiple items, it was important to test for scale reliability. This is measured using Cronbach's alpha, a widely used reliability measure (Cronbach, 1951). This is a test for internal consistency, and the value of alpha increases as the intercorrelations between test items increase. Item-to-total correlation was assessed for each question, as low correlation could indicate measurement of a different variable. Therefore, any questions with a correlation of less than 0.50 were removed from the scale (Ewing and Napoli, 2005). This ensures that the variance within the scale is attributed to differences within the responses. A target internal consistency of 0.70 (Nunnally, 1978) was exceeded by all scales, with the exception of risk attitude towards the farm business in general, which had an alpha of 0.67.

Fewer questions being included in the final scales was the outcome of meeting the established thresholds. As stated previously, four scales were developed: one to measure risk appetite specific to the marketing of wheat, one to measure risk appetite specific to the marketing of canola, one for general business risk appetite, and one for locus of control. The scale for wheat marketing risk consisted of four questions, one of which had low correlation with the others.

The question with a low correlation to the other questions was dropped from the scale. This resulted in the wheat specific risk scale being composed of three questions. These results can be seen in Table 3.2. The scale for canola marketing risk consisted of a similar set of four questions. As in wheat, one question was not highly correlated with the others, and this question was dropped from the scale. This resulted in the canola specific risk scale being composed of three questions, as shown in Tables 3.3. The general business risk scale had one of three questions dropped, resulting in a final scale of two questions, as seen in Table 3.4. The locus of control scale had an initial alpha of 0.81; however, several questions had item-to-total correlations below 0.50, resulting in four of nine questions being dropped. The final scale for locus of control consisted of five questions[2], as seen in Table 3.5.

Table 3.2: Original Wheat Risk Attitude Scale

	Wording	Mean	Std. Dev.	Original Item-Rest Correlation	Final Item-Rest Correlation
1	When selling my wheat, I prefer financial certainty to financial uncertainty.	2.84	1.29	0.1853	(Dropped)
3	I am willing to take higher financial risks in order to realize higher average returns.	4.57	1.3	0.5796	0.6247
4	I like taking financial risks.	3.51	1.49	0.5359	0.5157
5	When selling my wheat, I am willing to take higher financial risks in order to realize higher average returns.	4.43	1.34	0.5322	0.6264
	Alpha			**0.6690**	**0.7561**

---

[2] Fewer questions in the locus of control scale also create concerns with what the scale actually tests. The removed questions are worded around personal ability, hard work, actions, and powerful 'others'. The remaining questions are worded for accident, luck, fortune, and control.

Table 3.3: Original Canola Risk Attitude Scale

	Wording	Mean	Std. Dev.	Original Item-Rest Correlation	Final Item-Rest Correlation
2	When selling my canola, I prefer financial certainty to financial uncertainty.	2.73	1.32	0.1006	(Dropped)
3	I am willing to take higher financial risks in order to realize higher average returns.	4.62	1.27	0.6062	0.6513
4	I like taking financial risks.	3.59	1.44	0.5230	0.5033
6	When selling my canola, I am willing to take higher financial risks in order to realize higher average returns.	4.58	1.32	0.4907	0.6431
	Alpha			**0.6343**	**0.7633**

Table 3.4: Original General Business Risk Attitude Scale

	Wording	Mean	Std. Dev.	Original Item-Rest Correlation	Final Item-Rest Correlation
7	I like "playing it safe".	3.31	1.38	0.5370	0.8773
8	With respect to the conduct of business, I am risk averse.	3.70	1.16	0.3057	(Dropped)
9	With respect to the conduct of business, I prefer certainty to uncertainty.	2.57	1.23	0.4650	0.8773
	Alpha			**0.6223**	**0.6793**

Table 3.5: Original Locus of Control Scale

	Wording	Mean	Std. Dev.	Original Item-Rest Correlation	Final Item-Rest Correlation
1	My success in marketing depends on whether I am lucky enough to deliver to the right place at the right time.	4.81	1.61	0.5937	0.6536
2	To a great extent my income is controlled by accidental happenings.	5.16	1.49	0.5681	0.5807
3	When I get the price I want, it is usually because I am lucky.	4.84	1.49	0.6264	0.6520
4	Farm income is determined by my own actions	4.88	1.43	0.4144	(Dropped)
5	When I get the price I want, it is usually because I worked hard for it.	4.66	1.28	0.3089	(Dropped)
6	It is not wise for me to plan too far ahead, because markets turn out to be a matter of bad fortune.	4.67	1.60	0.5920	0.6148
7	Whether or not I am successful in marketing depends mostly on my ability.	3.66	1.84	0.3667	(Dropped)
8	I feel that the price I receive is mostly determined by people in powerful positions.	4.65	1.42	0.4903	(Dropped)
9	I feel in control of my marketing.	5.34	1.36	0.6227	0.5005
	Alpha			**0.8127**	**0.8120**

3.7   Data Representativeness

In order to see if the data received was representative of the Canadian grain production sector, comparisons were made between this thesis's responses and the Agricultural Census of 2011 from Statistics Canada. The comparison is presented in Table 3.6. In the 2011 census, the average farmer age in Alberta was 54.5; in Saskatchewan was 54.2; and in Manitoba was 53.1 (Statistics Canada, 2011b). In this thesis, the average age of respondents in Alberta is 53.12; in Saskatchewan is 54.71; and in Manitoba is 52.22.

Table 3.6: Census and Survey Age Data

Average Age	Stats Canada (2011)	Survey (2014)
Alberta	54.5	53.12
Saskatchewan	54.2	54.71
Manitoba	53.1	52.22

Source: (Statistics Canada, 2011b)

The census also reported farm types by province. A total of 41,505 farms in Alberta, Saskatchewan, and Manitoba self-identified as grain and oilseed producers in the census. The provincial distribution on these farms was 31% in Alberta, 53% in Saskatchewan, and 16% in Manitoba (Statistics Canada, 2014a). This research contains a similar distribution in responses with 27% in Alberta, 56% in Saskatchewan, and 17% in Manitoba.

The 2011 census reported 43,097 farms of at least 760 acres within Alberta, Saskatchewan, and Manitoba. When compared to the survey data used in this thesis, it becomes clear that the responses to this thesis are skewed towards larger farms. However, part of this skew is due to this thesis's minimum acreage requirement used to provide a greater focus on farmers who would be more likely to use forward marketing, as noted previously under potential sources of bias. Figure 3.2 compares the percent of respondents by farm size in acres between this thesis and the Statistics Canada 2011 responses of at least 760 acres.

Figure 3.2: Comparison of Percent of Respondents by Farm Size (Acres)

Bar chart comparing percent of respondents by farm size categories for Stats Canada (2011) and Survey (2014). Categories and approximate values:
- 760 - 1,119: Stats Canada (2011) ≈ 22.8%, Survey (2014) ≈ 5.8%
- 1,120 - 1,599: Stats Canada (2011) ≈ 20.9%, Survey (2014) ≈ 12.2%
- 1,600 - 2,239: Stats Canada (2011) ≈ 19.0%, Survey (2014) ≈ 22.7%
- 2,240 - 2,879: Stats Canada (2011) ≈ 11.2%, Survey (2014) ≈ 16.6%
- 2,880 - 3,519: Stats Canada (2011) ≈ 7.5%, Survey (2014) ≈ 11.8%
- > 3,520: Stats Canada (2011) ≈ 18.4%, Survey (2014) ≈ 30.8%

Source: (Statistics Canada, 2011a)

3.8   Stated Changes by Producers

This thesis had planned on asking producers to report their yearly marketing method use for 2010 through 2013. Unfortunately, preliminary interviews found that data prior to 2012 was unlikely to be accurate, if available at all. This result was unsurprising as the loss of detail of incidental memories over time is a subject well researched (Budson and Price, 2005; Talamini and Gorree, 2012). Stated use of futures markets, forward contracts, and options contracts prior to 2012 were given with low confidence, and access to marketing records was often not readily available. In addition, requiring users to look up previous years of farm records had potential to increase survey times, potentially increasing levels of survey satisficing. Given the expectation of low accuracy for marketing method use previous to 2012, a more direct question needed to be developed that would illicit responses with higher confidence.

When producers were asked directly how they had changed their marketing since 2012, the year

the Canadian wheat market opened, producers were confident in their responses. The decision

was made to use the stated change in marketing method use as of 2012 as the dependent

variables for regressions. Two questions were crop specific: changes in forward contracts for

wheat and forward contracts for canola. However, due to concerns about low futures market and

options market use from previous literature, change in producers' use of futures and options

markets as of 2012 was not crop specific. In addition, producers were not asked for specifics on

which wheat futures market was used in using futures or options markets. Producers were asked

a general question of if they had used futures and options markets for both wheat and canola for

each year from 2010 to 2013. Preliminary responses to these questions were met with greater

certainty, while providing lower time commitments. A summary of these responses is shown in

Figure 3.3.

Figure 3.3 Stated Change in Marketing Method Use since 2012
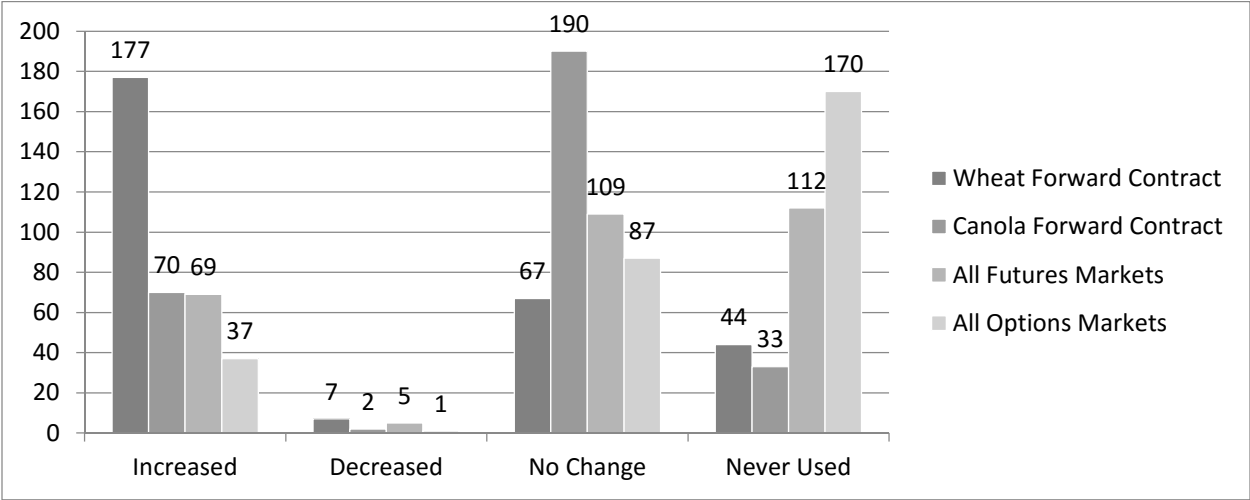
For change in use of wheat forward contracts: 117 producers reported increased use, 7 reported a

decrease in use, 67 reported no change in use, and 44 reported that they had never and continued

to not use forward contracts for marketing wheat. The stated changes in marketing canola, which can be considered to have a more mature and robust market for forward contracts: 70 reported an increase in use, 2 reported a decrease in use, 190 reported no change in use, and 33 reported that they had never and continued to not use forward contracts for marketing canola. For the change in use of futures markets for all crops: 69 reported an increase in use, 5 reported a decrease in use, 109 reported no change in usage, and 112 reported that they had never used and continued to not use the futures markets in their crop marketing. For stated change in use of options markets: 44 reported an increase in use, 1 reported a decrease in use, 87 reported no change in their use, and 170 reported that they had never used and continued to not use options markets in their crop marketing.

3.8.1 Dependent Variable Concerns

There are three main concerns with using a dependent variable for stated change in marketing method use. The most prominent is that a stated increase in usage is not quantified. For example, if one producer increases their use of a marketing method from 1% to 3% of their expected crop, and another increases their use of the same marketing method from 10% to 30% of their expected crop, both producers are counted as equivalent. The judgement for what is defined as an increase is left to the producer, rather than defined in this thesis.

The dependent variable in this thesis also lacks clarity in defining the marketing methods for which producers state a change in use. The main concern lies in the variety of forward contracts available to the producer. While the classic forward contract required a set futures value at a set time, newer varieties allow for the futures to be set over time via a variety of schemes. These new varieties of forward contracts may confuse the issue of what constitutes use of the futures market, and may have inflated the stated increase in futures market use. Similarly, modern

futures contracts allow for producers to make forward contracts with synthetic options; options underwritten by and traded exclusively with the grain elevator as a counterparty. Again, use of these option like forward contracts may be what is used by those producers who stated an increased use in options markets. Forward contracts that deal with long term futures market or options market positions do not deal with brokers and therefore differ from the results listed in previous literature. This thesis did not specify these forward contracts as inclusive or exclusive to the responses, and therefore this concern should be kept in mind when comparing this thesis's results to those of previous literature. Further research which plans to exclude these forward contracts may find different results than those published here.

The final concern with the dependent variable is concerning the time period covered in this thesis. By simply asking producers if they increased their use of forward contracting as of 2012, context around yield levels are not controlled for. This is of specific concern because the reported yields from producers has been increasing over this time period. Figure 3.4 shows the yearly production in the Canadian prairie provinces from the years 2008 to 2015 as reported by Statistics Canada. There is the possibility that an increase in producers' use of forward marketing methods may be motivated by an expectation of decreasing prices due to larger supply. Additionally, increased yields could lead to greater rates of forward contracting by producers as a means to reserve elevator space and ensure timely sales.

Figure 3.4: Canadian Prairie Province Annual Production (Metric Tonnes)
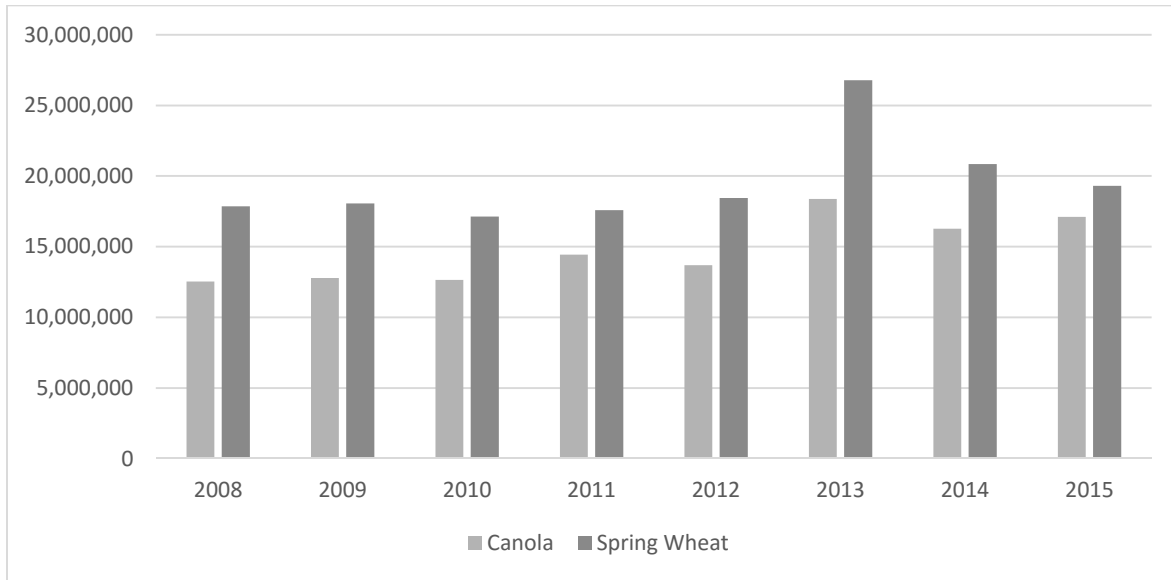
Source: (Statistics Canada, 2014b)

3.9   Marketing Method Use

A comparison of this survey's responses can be made to previous research. This thesis found

that, for at least one year from 2010 to 2013, a total of 86% of respondents used forward

contracts to market wheat or canola, 62% used futures markets for an undefined crop, and 42.4%

used options markets for an undefined crop. These findings are similar to previous work in

indicating that forward contracting has the highest adoption rate among producers. Futures

markets rate the second highest in use, with options markets being the least adopted forward

marketing method. Goodwin and Schroeder (1994) found that the following marketing methods

for wheat were used by producers: 29.95% used forward contracting, 22.88% used futures,

33.53% used options, and 29.04% used deferred pricing. Musser, Patrick, & Eckman (1996)

surveyed corn and soybean producers about their marketing and found that 74.1% forward

contracted, 53.4% hedged with futures, and 34.5% hedged with options. However, previous

work has not always differentiated futures and options markets and instead asked about their use together in a single question. Sartwelle et al. (2000) found a reported use rate of 70.0% for forward contracts, and 54% for use of futures and options, which were not differentiated in their question. Davis et al. (2005) focused on producers of soybean and corn, and found that 30.8% used forward contracts. Davis et al. found that 7.9% used futures and options, but did not differentiate the two. Previous work is compared in Table 3.7.

Some previous research compared marketing rates based on physical factors. Shapiro and Brorsen (1988) found that 63% of producers hedged a part of their crop, but provided no definition of hedging to respondents. On average, only 11.4% of total acreage was hedged in the futures markets, and only 20.5% was forward contracted. Schroeder, Parcell, Kastens, & Dhuyvetter (1998) found that 17% of production was forward contracted, 8% hedged with futures, and 14% hedged with options.

Table 3.7: Marketing Use Comparison

	Crop Types	Sample Size	Data Source	Forward Contracts	Futures Markets	Options Markets
Goodwin & Schroeder 1994	Wheat	509	1991 members of the Kansas Farm Management Association	29.95%	22.88%	33.53%
Musser, Patrick, & Eckman 1996	Corn and Soybeans	62	1993 Top Farmer Crop Workshop at Purdue University	74.1%	53.4%	34.5%
Sartwelle et al. 2000	Undefined Grain	351	Kansas, Iowa, and Texas agricultural producers (1997/1998)	70%	52%	52%
Davis et al. 2005	Corn and Soybeans	1266	National Agricultural Statistics Service 1999	30.8%	7.9%	7.9%
Backman 2015	Wheat and Canola	295	IPSOS Internet Survey (AB, SK, MB) 2014	85.1%	62.0%	42.4%

3.10 Descriptive Statistics

The main focus of this thesis is the marketing choices made by producers with similar personality characteristics. These characteristics include locus of control, risk attitude, and human capital gained through previous experience. The summary statistics of the responses to locus of control and risk attitude are listed in Table 3.8. Previous experience is broken into frequency of use between the years of 2010 to 2012. A breakdown of respondents by experience is listed in Table 3.9. Stated usage of marketing methods by year is provided in Table 3.10. Summary statistics for control variables are provided in Table 3.11.

Table 3.8: Summary Statistics of Variables of Interest

	Mean	Std. Dev.	Min	25th Percentile	Median	75th Percentile	Max
Locus of Control [a]	4.98	1.07	1.67	4.33	5	5.67	7
Risk Attitude – Wheat [b]	4.23	1.12	1	3.33	4.33	5	7
Risk Attitude – Canola [b]	4.27	1.13	1	3.67	4.33	5	7
Risk Attitude – General [b]	2.95	1.15	1	2	3	3.5	7

a. *Locus of Control is an indication of an individual's perception of control on the outcome of events. A higher value indicates a greater perception of control by the individual. These values were obtained by asking a respondent to indicate their agreement to statements using a seven point Likert scale, and then taking an average of their responses.*

b. *Risk Attitude is an indication of an individual's comfort with risk in a specific context. A higher value indicates a greater comfort with risk, or potentially seeking more risk. Respondents were given several statements regarding the marketing of wheat and canola crops and their farm business in general. Respondents were asked to state their agreement using a seven point Likert scale. Risk attitudes were determined by taking the average of their responses.*

The locus of control and risk attitude were measured using seven point Likert scales. For locus of control, lower values indicate an external locus of control, and a higher value indicate an internal locus of control. With responses having a mean of 4.98 and a median of 5, the majority of respondents stated having an internal locus of control. This means that the majority of respondents feel that the outcome of events does not depend on luck.

Likewise, for the risk attitude scales, lower values indicated a lower comfort with risk, while a higher value indicates a greater risk tolerance. Responses for risk attitude with respect to marketing specific crops also had means and medians greater than the Likert scale midpoint of 4, indicating that the majority of respondents are risk tolerant. For marketing wheat specifically, the mean is 4.23 with a median of 4.33. With respect to marketing canola, the mean response is 4.27 with a median of 4.33. Respondents were also asked to rank themselves on a 7-point Likert scale as to their risk management ability. As Figure 3.5 displays, the majority of respondents ranked themselves as average or better at managing risk. In contrast, asking questions framed around general business risk resulted in a mean and median that were less than the scale

midpoint of 4. Responses to general business risk have a mean of 2.95 with a median response of 3, indicating the majority are uncomfortable with taking risks on their overall business.

Figure 3.5: Reported Self-Assessment of Risk Management Ability
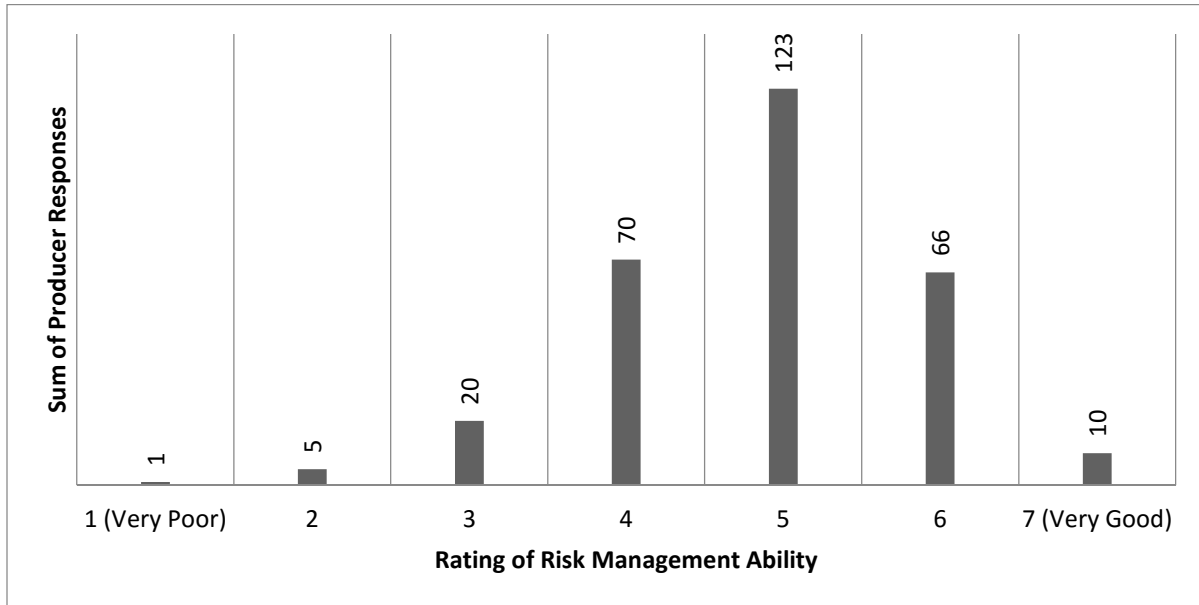
Producers were asked about their specific usage of forward marketing methods between the years of 2010 to 2013. From these responses, human capital dummy variables were created from stated use between the years of 2010 through 2012. Those who stated using a marketing method for only one of the three years were considered to be infrequent users. Those who stated using a method for more than one year were considered to be frequent users. This distinction is made to address potential differences in human capital accumulation and potential losses in human capital over time due to low usage rates. Reported usage rates are listed by percent of respondents in Table 3.9.

Long term usage of forward contracts was highest for both wheat and canola. The majority of respondents used frequent forward contract use, with 73% stating use of canola forward contracts for two or more years. Only 9% reported using forward contracts infrequently for canola. For

wheat, 23% of respondents stated they used forward contracts for only one year, while frequent use was reported by 30% of respondents.

Frequent use of canola futures markets was also common among respondents, with 17% reporting use in two or more years. Only 4% reported using canola futures markets infrequently. Wheat futures market use was an even split, with 7% reporting infrequent use and a similar 7% reporting frequent use.

Options market use was again most common in canola. Frequent use of canola options markets was reported by 6% of respondents, while 4% reported infrequent use. Wheat options market usage was the only forward marketing method where infrequent use was more common than frequent use. Infrequent use was reported by 4% of respondents, while frequent use was reported by only 2%.

Table 3.9 Marketing Method Experience by Percent of Sample

	Wheat		Canola	
	Use 1 Year	*Use >1 Year*	*Use 1 Year*	*Use >1 Year*
Forward Contract	23%	30%	9%	73%
Futures Markets	7%	7%	4%	17%
Options Markets	4%	2%	4%	6%

Yearly stated marketing method use for all crops is listed in Table 3.10. These results show a clear increase in the use of forward contract use in 2012 and 2013. However, these results do not show a clear increase in the use of futures markets or options markets. Stated use does clearly

favor selling futures contracts by producers. This result suggests that producers are using futures

for hedging purposes, similar to the examples in Table 2.1 and Table 2.2 shown previously.

Table 3.10: Yearly Stated Forward Marketing Method Use (All Crops)

		2010	2011	2012	2013
Forward Contracts	Total Used	211	207	234	233
Futures Market	Buy	7	8	9	8
	Sell	53	45	50	47
	Total	**60**	**53**	**59**	**54**
Options Market	Buy Put	9	10	7	14
	Buy Call	8	7	10	5
	Sell Put	2	4	1	7
	Sell Call	7	4	5	6
	Total	**26**	**25**	**23**	**32**

Yearly use of options shows no clear trend in their use. Producers were as likely to purchase a

put as they were to purchase a call. As stated previously in Section 2.3.3, hedging of price risk

for unpriced grain can be accomplished by purchasing a put, but purchasing a call is a more

speculative matter. A call gives the holder the right to purchase futures at the strike price and

gains value as the futures market increases. Like a put, the call option can expire worthless,

meaning the maximum risk the call option holder is exposed to is the value of their premium

paid initially. However, should a producer be holding a call option on unpriced grain, they are

doubling their exposure to price risk. As the futures market increases in value, the value of their

unpriced grain and the value of a call option will increase. Likewise, the value of both the

unpriced grain and the call option decrease as the futures market decreases in value.

Similarly, some producers reported selling options. When selling an option, a producer opens

themselves up to unlimited risk. A producer who chooses to sell an option receives a premium,

however they have opened a position in the market which must be closed in the future with the purchase of a similar option. Between selling and buying the option, there is the potential for the intrinsic value of the option to increase resulting in a net loss to the seller. Alternatively, the premium received for selling is the max potential return, should the sold option become worthless. It is clear that, as some producers are selling options and buying calls, that there is some speculative use of options by producers. These actions suggest that they are using options to increase price risk, and therefore are likely viewed as risky by the producers.

Producers were asked questions on a variety of demographic factors which were suggested as significant in previous literature. The summary statistics for these variables are listed in Table 3.11.

Table 3.11: Summary Statistics of Control Variables

Variable	Mean	Std. Dev.	Min	25th Percentile	Median	75th Percentile	Max
Managerial Experience [a]	26.95	11.63	1	20	30	35	57
Formal Education [b]	2.41	1.40	0	1	3	4	5
Marketing Workshop Hours	16.50	20.11	0	4	10	20	100
Use of Marketing Advisor	0.20	0.40	0	0	0	0	1
Debts / Assets [c]	2.57	1.06	1	2	3	3	5
Farm Size (acres)	3,380.27	2,557.56	1,000	1,800	2,500	4,000	18,000
Insurance Use	2.30	0.80	1	2	2	3	4
Soil Zone	3.11	1.74	0	2	3	5	5
Total Storage	140,000	120,000	5,000	63,150	100,000	150,000	750,000
Workers - Full Time	2.66	2.47	0	2	2	3	25

a. *Total years as primary manager of a farm enterprise.*
b. *Education is presented here in a scale format with values from 0 to 5 indicating completed education level. 0 = Less than public school, 1 = Public School, 2 = Completed Trade School, 3 = Community College, 4 = Undergraduate, 5 = Graduate or more.*
c. *Debt to Asset ratio was asked on a 5 point Likert scale, with low values indicating lower debt levels. 1 = (0%), 2 = (1% - 9%), 3 = (10% - 24%), 4 = (25% - 50%), 5 = (50% <).*

Respondents to the survey had on average 26.95 years of experience as the primary manager of the farm, with a median value of 30. The average response to yearly hours at marketing

workshops was 16.50 hours. This indicates that some respondents invested heavily in education workshops, as the median response of 10 hours indicates that half of respondents spent 10 hours or less attending marketing workshops yearly. Only 20% of respondents indicated that they used a marketing advisor. Mean response for debt to asset ratio was 2.57, with a 75th percentile value of 3 indicating that the majority of respondents stated their debt level was 24% or less of the farm assets worth. The number of insurance types used was stated with a mean of 2.30 and a median of 2, meaning half of respondents held two or more types of insurance on their crops in 2013. Average stated on-farm storage was 140,000 bushels, with a median of 100,000 bushels. For full time workers on farm, the mean response was 2.66, with a median of 2, meaning half of respondents had two or fewer employees on the farm.

For the variable measuring formal education, the mean response was 2.41 with a median of 2. The three most common levels of formal education among respondents was a high school education, followed by a university degree, and finally a non-university certificate or diploma. A full report of respondent education levels are presented in Table 3.12.

Table 3.12: Summary of Formal Education Responses

No certificate, diploma, or degree	16
High school certificate or equivalent	96
Apprenticeship or trades certificate or diploma	33
Community college, CEGEP or other non-university certificate or diploma	59
University degree, for example, a bachelor degree	83
Post-graduate degree, for example, Master's, PhD, lawyer, doctor	8

For stated soil zones of crop acres, the majority of respondents farmed in the black, dark brown, and brown soil zones. The full list of responses are presented in Figure 3.6. A total of 34

respondents reported having crop acres in two soil zones, while 3 respondents reported farming in three soil zones. For these summary statistics, those who reported more than one soil zone have only their first response included.

Figure 3.6: Reported Soil Zones of Crop Acres
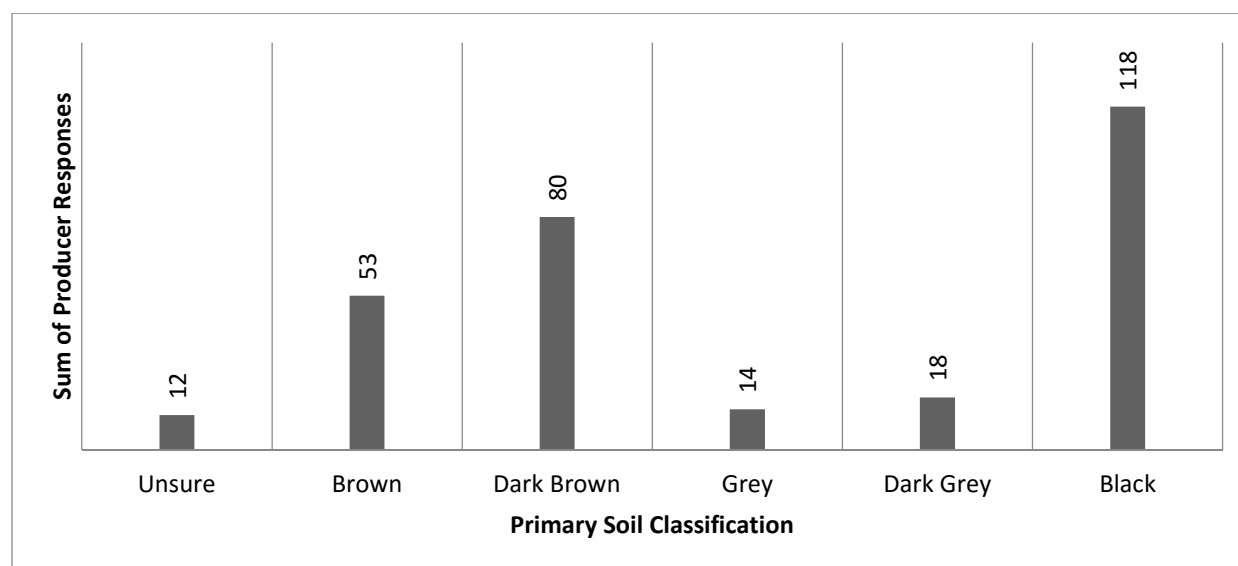
3.11 Conclusion

This chapter covers data collection, data cleaning, and summary statistics. The survey sample is checked for representativeness by being compared to the most recent Canadian agricultural census data available, collected in 2011. In addition, interpretations are included for the main variables of interest, as well as the control variables.

Working with survey data can be challenging as respondents may not answer all questions. Explanations are provided for excluding responses. These include respondents that refused to answer questions key to the dependent variables, or to the independent variables that addressed the main questions of interest. These include questions on assessing a producer's locus of control, risk attitude, or marketing experience. Respondents who refused to provide responses to

control variables were also removed. Of the 516 responses to the survey, a total of 221 were excluded resulting in a usable sample size of 295.

In order to make meaningful inferences from this study, it would help if the sample closely approximated the sample of western Canadian farmers as a whole. The most recent farm census was completed by Statistics Canada in 2011. In order to check the representativeness of this thesis, comparisons were made between this sample and the 2011 census on producer age, provincial distribution of responses, and farm size in acres. While producer age and provincial distribution were similar, this thesis has a disproportionate amount of larger farms in the sample. However, the larger than average farm size is by design as this thesis restricted the sample to farms of at least 1,000 acres in size.

This thesis has three main questions to explore:

1. Have producers in the Canadian prairie changed their use of forward contracts since the 2012 marketing year?

2. Have producers in the Canadian prairie changed their use of futures and options markets since the 2012 marketing year?

3. Can common attributes be identified among the producers who chose to increase use of forward marketing methods?

This chapter suggests answers to the first two questions. As shown in Figure 3.3, there has clearly been an increase in forward contract use for wheat and canola since 2012. The increase in forward contract use has been the most prominent for wheat, although increased use of canola forward contracts was stated too. Table 3.10 also highlights that producers who were not using forward contracts prior to 2012 began using them.

76

This thesis also suggests that there has been an increase in futures and options market use as of 2012, although to a lesser degree than forward contracting. Table 3.10 also provides some insight into how respondents are using these markets. For futures market use, the majority of stated activity involves selling futures contracts. This suggests that producers are using the futures markets for hedging rather than speculation. For the options market, usage is unclear as there is no clear choice of contract use throughout the years.

This chapter also provided summaries of the responses to the independent variables of interest and the control variables. This thesis found that the majority of respondents had an internal locus of control, and were risk tolerant with respect to the marketing of canola and wheat. However, the majority of respondents were found to be uncomfortable with risk when it related to their business as a whole. The respondents also stated having used forward contracting more than futures or options markets. In Chapter 4, a probit regression model is developed using these independent variables and control variables in an attempt to answer the third question of this thesis: Are there commonalities between those producers who increased their marketing method use?

Chapter 4: Probit Regression Analysis

4.1   Introduction

This chapter addresses the third question of this thesis: can common attributes be identified among the producers who chose to increase their use of forward marketing methods? The following results are from the econometric analysis of the survey data. In this analysis, the dependent variable is a statement from producers on whether they increased their use of marketing methods after the removal of the CWB single desk on Aug 1st, 2012. Probit regressions were deemed an appropriate regression method due to the binary nature of the dependent variables. Separate regressions were run for a stated increase of each marketing method of interest. The probit regression suggests which independent variables have a significant effect on producers' marketing decisions.

Marginal effects of each independent variable are also reported. For this thesis, the marginal effects are the expected change in probability of a producer increasing their marketing method use in 2012 due to a change in the independent variables. The marginal effects are interpreted differently depending on whether the variable is linear or categorical in nature. The marginal effects of linear variables show the expected effect of a one unit change in the independent linear variable on the probability that the dependent variable is true, ceteris paribus. Categorical variables have a base case, which is excluded as a variable in the regression, and the marginal effect for each related categorical variable is the expected change in the probability that the dependent variable is true, in comparison to the base category, ceteris paribus.

4.2 Regression Model

Producers were asked about their perceived change in the use of forward contracts, futures markets, and options markets on August 1st 2012. Of particular interest are those producers who responded that they increased their usage of a marketing method; specifically individuals who reported an increase in the use of wheat or canola forward contracts, future markets for any crop, or option markets for any crop.

The standard regression model assumes a linear dependent variable. Therefore, the conditional mean of the outcome is a linear combination of the regressors is shown in equation 4.1.

$$E(Y_i | X_{1i}, \ldots, X_{Ki}; \beta_0, \ldots, \beta_K) = \beta_0 + \sum_{k=1}^{K} \beta_k X_{ki} \qquad (4.1)$$

Source: (Greene, 2012)

In a linear regression Y is the dependent variable, X is the vector of independent variables, and β is the coefficients of the independent variables. The coefficient values estimate the change in the dependent variable for a one unit change of an independent variable. However, the dependent variables in this regression are either true or false: either the producer changed their marketing in 2012 (true), or they did not (false). This creates discrete choice dependent variables. For a regression of those who stated an increase, the dependent variable will be equal to 1; otherwise the value will be 0.

The discrete dependent variables of this thesis means a probit model is more appropriate as it models the conditional probability that the dependent variable is equal to 1. This model is shown in equation 4.2.

$$P(Y_i = 1 | X_{1i}, \dots, X_{Ki}; \beta_0, \dots, \beta_K) = \phi(\beta_0 + \sum_{k=1}^{K} \beta_k X_{ki}) \tag{4.2}$$

Source: (Greene, 2012)

In the probit regression, the dependent variable is forced to be either 0 or 1, and ϕ (.) is the cumulative distribution function of the standard normal distribution. This regression estimates if an independent variable will have a positive or negative effect on the probability that the dependent variable is equal to 1.

In a linear regression, the coefficients would be the marginal effects of the independent variables on the dependent variable. The equation for the marginal effects of a linear regression is shown in equation 4.3.

$$\frac{\delta E(Y_i | X_{1i}, \dots, X_{Ki}; \beta_0, \dots, \beta_K)}{\delta X_{ki}} = \beta_k \tag{4.3}$$

Source: (Greene, 2012)

However, as this thesis uses a probit regression, the marginal effects of the variables are dependent on the values of all the other regressors and the regression coefficients. The equation for marginal effects in a probit regression is shown in equation 4.4.

$$\frac{\delta P(Y_i = 1 | X_{1i}, \dots, X_{Ki}; \beta_0, \dots, \beta_K)}{\delta \beta_{ki}} = \beta_k \phi(\beta_0 + \sum_{k=1}^{K} \beta_k X_{ki}) \tag{4.4}$$

Source: (Greene, 2012)

In equation 4.4, $\phi(.)$ is the standard normal probability density function. All the probit

regressions and marginal effects of the probit regressions will be calculated using the statistical

software package Stata.

4.3   Dependent Variables

As stated in Chapter 3, the dependent variables for the following regressions are a stated increase

in the use of a marketing method by the producer after the opening of the Canadian wheat market

in 2012. Four dependent variables were used. These were a stated increase in the use of forward

contracts for marketing wheat, a stated increase in the use of forward contracts for marketing

canola, a stated increase in the use of futures markets for any crops, and a stated increase in the

use of options markets for any crops. A separate probit regression is run for each of these

dependent variables with all independent variables, unless otherwise stated. Each regression

then has marginal effects of the independent variables estimated.

4.4   Independent Variables

The independent variables are grouped into variables of interest and control variables. Previous

applicable literature for all variables can be found in Chapter 2, and this thesis's measurement of

variables of interest is discussed in Chapter 3. This section is a reference summary of the

independent variables in the following regressions.

Variables of interest include locus of control, risk attitude, and previous marketing experience.

For locus of control, a higher value indicates that a respondent has less belief that outcomes are a

matter of luck. Risk attitude measures a respondent's comfort with risk in marketing (risk

attitude wheat, risk attitude canola) and comfort with risk in decisions affecting a business in

general (risk attitude general business). Previous experience in using marketing methods was

extrapolated from respondents' statements. For each of the years from 2010 through 2012,

respondents were asked if they had used forward contracts for wheat or canola, futures markets

for any crop, or options markets for any crops. A dummy variable for limited experience (Use 1

Year) was set to true if a producer indicated they had only used the marketing method for one of

the three years. Should the producer indicate that the marketing method had been used for two

or all three years a dummy variable for extended experience (Use >1 Year) was set to true.

Control variables are those that have been found significant in previous research (Barkley and

Schroeder, 1991; Davis et al., 2005; Goodwin and Schroeder, 1994; Just et al., 2002; Musser et

al., 1996; Schroeder et al., 1998; Shapiro and Brorsen, 1988; Tomek, 1987; Townsend and

Brorsen, 2000; Willock et al., 1999; Wolf, 2012). Control variables in these regressions are total

years as primary farm manager, level of formal education, total crop acres, use of crop insurance,

soil zone of farm, total on farm storage, total yearly hours spent at marketing workshops, total

paid marketing workshops attended, use of a marketing advisor, farm debt level as a ratio, and

total on farm labour employed.

4.5   Categorical Variables

For these regression models, several attributes that were presented in scale format in Chapter 3

have been converted into categorical variables. Each set of categorical variables has a base case

not included. The coefficients of the variables included show the estimated effect that the

difference from the base case has on the dependent variable. The base case that education

variables are being compared to is producers who have completed less than a high school

diploma. For soil zones, the base case is producers who farm in the black soil zone.

For previous marketing method experience, producers' stated use from 2010 to 2012 was used to create categorical variables indicating how experienced a producer was with a marketing method. A variable was created for producers who used a marketing method for only one year in the three year time period, as infrequent users may not retain knowledge between uses. A variable was also created for producers who used a marketing method for more than one year, as they are more likely to remember previous experiences due to frequent use. Both were compared to a base case of a producer who did not use these marketing methods at all from 2010 to 2012.

4.6 Regression Results and Marginal Effects

The four probit regressions were run on similar models and Table 4.1 lists a summary of the results. The pseudo R^2 of the model estimates how much of the variability of the dependent variable is captured by the independent variables, and is used as an estimator of how representative the model is. The model for options market use had a pseudo R^2 of 0.452, which is the best fit of all the models tested. Second best fit, with a pseudo R^2 of 0.305, is the model for futures markets use. Forward contracting of wheat has a pseudo R^2 of 0.194 making it the third most representative model. That left forward contracting of canola with a pseudo R^2 of 0.181 as the least representative.

Two of the four regressions in this thesis ran into issues of complete separation on categorical variables. Complete separation occurs when an independent variable becomes a perfect predictor of the dependent variable. In both issues there were no records where the categorical variable and dependent variable were true. Therefore no comparison can be made on the categorical variable, and no change in probability estimated, and all responses with the categorical value as true are removed. This issue occurred for a minority of records, specifically

for categorical independent variables representing a small subsample of the respondents. This issue is likely due to sample size, and would be resolved if a larger sample was used.

A total of 8 of the 295 responses stated they had completed a graduate degree or higher. All these responses also did not state that they had increased their use of forward contracts for canola as of 2012. The result is that, in this sample, having a graduate degree or higher decreases the probability of increasing forward contract use for canola in 2012 by 100%. To remove this perfect prediction, all 8 responses from those producers with graduate degrees were combined with the maximum formal education undergraduate variable. This change is only made for the regression for a stated increase in use of forward contracts for canola.

A similar problem occurred for the regression on stated increase in the use of options markets in 2012 for any commodity. A total of 11 responses stated that they did not know the soil zone of their crop acres. All of these responses also did not state an increase in the use of options markets as of 2012. This issue was controlled for in the same manner, with all 11 responses being were omitted, resulting in this regression using only 284 responses.

Regression results for stated increase in use of each marketing method are presented in Table 4.1 to allow for easy comparison of variables that were found to be significant. The remaining tables report the marginal effects of the variables. Table 4.2 lists the marginal effects for stated increase in use of forward contracts for wheat. Table 4.3 lists the marginal effects for stated increase in the use of forward contracts for canola. Table 4.4 lists the marginal effects for stated increase in the use of futures contracts for all commodities. Table 4.5 lists the marginal effects for stated increase in the use of options markets for all commodities.

Table 4.1: Probit Regression Results Summary

	Increase Forward Contracts Wheat	Increased Forward Contracts Canola	Increased Futures Market Contracts All Crops	Increased Options Market Contracts All Crops
Locus of Control Scale	-0.00965	-0.0857	**0.272****	0.241
	(-0.11)	(-0.88)	(-2.47)	(-1.49)
Risk Attitude Scale (Marketing Wheat)	-0.0992	0.416	0.228	**1.117***
	(-0.36)	(1.24)	(-0.65)	(-1.76)
Risk Attitude Scale (Marketing Canola)	0.167	-0.197	-0.317	**-1.303****
	(-0.61)	(-0.61)	(-0.93)	(-2.11)
Risk Attitude Scale (General Business)	-0.0391	-0.0204	0.1	**0.425*****
	(-0.47)	(-0.23)	(-1.03)	(-2.8)
Wheat Forward Contract Use 1 Year	**1.074******	0.0521	0.0644	-0.141
	(-4.2)	(0.20)	(-0.23)	(-0.34)
Wheat Forward Contract Use > 1 Year	0.410*	0.184	-0.0674	-0.468
	(-1.73)	(0.70)	(-0.23)	(-1.13)
Wheat Future Market Use 1 Year	0.667	0.446	0.251	**1.169****
	(-1.46)	(1.15)	(-0.61)	(-2.32)
Wheat Future Market Use > 1 Year	-0.207	0.766	0.0233	0.269
	(-0.39)	(1.41)	(-0.04)	(-0.39)
Wheat Option Market Use 1 Year	0.323	-0.827	0.978	1.119
	(-0.59)	(-1.19)	(-1.61)	(-1.62)
Wheat Option Market Use > 1 Year	0.0477	-0.886	-0.437	0.384
	(-0.07)	(-1.14)	(-0.58)	(-0.44)
Canola Forward Contract Use 1 Year	**0.766****	**1.197*****	0.132	1.068
	(-2.08)	(2.95)	(-0.31)	(-1.12)
Canola Forward Contract Use > 1 Year	**0.725*****	**0.843****	-0.0908	1.024
	(-2.84)	(2.53)	(-0.27)	(-1.15)
Canola Future Market Use 1 Year	0.133	0.282	**2.157******	**1.752*****
	(-0.29)	(0.64)	(-4.59)	(-3.03)
Canola Future Market Use > 1 Year	0.00151	-0.276	**1.565******	0.820
	(0)	(-0.75)	(-4.37)	(-1.74)
Canola Option Market Use 1 Year	-0.658	0.677	-0.124	0.649
	(-1.24)	(1.19)	(-0.22)	(-1.13)
Canola Option Market Use > 1 Year	0.142	0.130	0.0942	**1.685*****
	(-0.33)	(0.26)	(-0.21)	(-3.13)
Primary Manager Years of Management	**0.0199****	0.0133	-0.0105	-0.0267
	(-2.41)	(1.51)	(-1.11)	(-1.98)
Farm Manager Education: High School	-0.286	0.265	-0.0542	-0.32
	(-0.64)	(0.57)	(-0.11)	(-0.60)

Farm Manager Education: Trade School	0.36	0.719	0.0855	-1.467
	(-0.71)	(1.37)	(-0.15)	(-1.65)
Farm Manager Education: College	-0.28	0.548	0.031	-0.755
	(-0.61)	(1.14)	(-0.06)	(-1.20)
Farm Manager Education: Undergraduate	-0.161	0.0758	0.0532	-0.716
	(-0.36)	(0.16)	(-0.11)	(-1.31)
Farm Manager Education: Graduate	-1.240*	.	-0.636	-0.265
	(-1.81)	(.)	(-0.53)	(-0.29)
Yearly Marketing Workshop Hours	-0.0018	0.00310	-0.00343	-0.00896
	(-0.40)	(0.63)	(-0.65)	(-1.14)
Marketing Advisor	-0.286	0.0312	0.0995	**1.373******
	(-1.21)	(0.13)	(-0.38)	(-3.8)
Debt to Asset Ratio	0.0743	0.0795	**0.202****	-0.0413
	(-0.88)	(0.87)	(-2.05)	(-0.28)
Total Farmed Acres	0.0000289	-0.0000299	0.0000801	-0.000134
	(-0.46)	(-0.46)	(-1.17)	(-1.10)
Total 2013 Insurance Use	0.0578	0.0319	0.146	0.199
	(-0.5)	(0.25)	(-1.09)	(-1.02)
Farm Soil Zone: Brown	-0.0416	**0.625***	0.266	-0.0933
	(-0.19)	(2.62)	(-1.05)	(-0.24)
Farm Soil Zone: Dark Brown	0.111	**0.665***	0.289	-0.35
	(-0.57)	(3.27)	(-1.31)	(-1.08)
Farm Soil Zone: Dark Grey	-0.261	-0.717	0.245	-0.354
	(-0.77)	(-1.50)	(-0.53)	(-0.54)
Farm Soil Zone: Grey	**-0.597***	**1.044***	-0.204	-0.67
	(-1.71)	(2.78)	(-0.43)	(-0.90)
Farm Soil Zone: Unknown	-0.562	0.229	0.432	.
	(-1.17)	(0.43)	(-0.81)	(.)
Farm Total Grain Storage	0.000000744	-0.000000326	0.000000283	0.00000207
	(-0.65)	(-0.27)	(-0.22)	(-1.06)
Total Workers Employed - Full Time	**-0.0975***	0.0250	-0.0655	-0.0557
	(-1.84)	(0.46)	(-0.97)	(-0.67)
Constant	-1.286	**-3.408******	**-3.402***	**-3.420****
	(-1.63)	(-3.67)	(-3.21)	(-2.11)
N	295	295	295	284
pseudo R-sq	0.194	0.181	0.305	0.452
*t statistics in parentheses, * p<0.10, ** p<0.05, *** p<0.01, **** p<0.001*				

4.6.1 Marginal Effects: Increase in Wheat Forward Contract Use as of 2012

Table 4.2 shows the results of the probit regression and marginal effects for stated increase in use of forward contracts for marketing wheat. These results did not find the locus of control scale or any of the risk attitude scales significant. Previous use of forward contracts for both wheat and canola were found to have significant correlation with an increase in wheat forward contract use in 2012.

Use of wheat forward contracts for one year was found to be significant at the 0.1% level, with a positive marginal effect of 40.6%. Use of a wheat forward contract for more than one year prior to 2012 was also found to be significant at the 10% level, with a positive marginal effect of 15.8%. The use of canola forward contracts for one year previous to 2012 was found to be significant at the 5% level, and to have a positive marginal effect of 29.0%. Using canola futures markets for more than one year previous was found to be significant at the 1% level, with a positive marginal effect of 27.4%.

Several of the control variables in the regression were found to be significant in a producers' decision to increase their use of forward contracts for wheat. The total number of years a farmer has been the primary farm manager was found to be significant at the 5.0% level, with a positive marginal effect of 0.8% for each additional year as primary manager. Managers education was also found to be significant at the 10% level, but only if they held a graduate degree or greater. A graduate level of education has a negative marginal effect of 46.9%. Farming in the grey soil zone was found to be significant at the 10% level, with a negative marginal effect of 22.6%. The number of people employed as full time farm labour was also found to be significant at the 10.0% level, with a negative marginal effect of 3.7%.

87

Table 4.2: Stated Increase of Wheat Forward Contract Use Marginal Effects

	Coefficient	Std. Err. (Coef.)	Marginal Effect	Std. Err. (ME)	P>z
Locus of Control Scale	-0.0096456	0.0872004	-0.0036487	0.0329882	0.912
Risk Attitude Scale (Marketing Wheat)	-0.0992126	0.2756112	-0.0375299	0.1042469	0.719
Risk Attitude Scale (Marketing Canola)	0.1665204	0.2739049	0.0629909	0.1035902	0.543
Risk Attitude Scale (General Business)	-0.039103	0.083619	-0.0147918	0.0316309	0.64
Wheat Forward Contract Use 1 Year	**1.074336**	**0.2558874**	**0.406397**	**0.095671**	**0**
Wheat Forward Contract Use > 1 Year	**0.4098634**	**0.2373316**	**0.155042**	**0.089868**	**0.084**
Wheat Futures Market Use 1 Year	0.6674577	0.4586795	0.2524841	0.1729831	0.146
Wheat Futures Market Use > 1 Year	-0.2074857	0.5349571	-0.0784871	0.2024067	0.698
Wheat Options Market Use 1 Year	0.3227257	0.5472418	0.1220798	0.207043	0.555
Wheat Options Market Use > 1 Year	0.0476903	0.6818489	0.0180401	0.2579367	0.944
Canola Forward Contract Use 1 Year	**0.7660403**	**0.3674977**	**0.289776**	**0.139082**	**0.037**
Canola Forward Contract Use > 1 Year	**0.7254542**	**0.2554545**	**0.274423**	**0.096886**	**0.005**
Canola Futures Market Use 1 Year	0.1329231	0.4590782	0.0502818	0.1736625	0.772
Canola Futures Market Use > 1 Year	0.0015126	0.355825	0.0005722	0.1346005	0.997
Canola Options Market Use 1 Year	-0.6584744	0.5315163	-0.2490859	0.2010363	0.215
Canola Options Market Use > 1 Year	0.1422385	0.4367938	0.0538056	0.1652294	0.745
Primary Manager Years of Management	**0.0198823**	**0.0082616**	**0.007521**	**0.003119**	**0.016**
Farm Manager Education: High School	-0.2861546	0.4492028	-0.1082458	0.1698131	0.524
Farm Manager Education: Trade School	0.3600111	0.5080512	0.136184	0.1922583	0.479
Farm Manager Education: College	-0.2799114	0.4614206	-0.1058841	0.1744618	0.544
Farm Manager Education: Undergraduate	-0.1614023	0.4463855	-0.0610548	0.1687996	0.718
Farm Manager Education: Graduate	**-1.239581**	**0.6865064**	**-0.46891**	**0.2595**	**0.071**
Yearly Marketing Workshop Hours	-0.0018047	0.0045673	-0.0006827	0.0017274	0.693
Marketing Advisor	-0.2863345	0.2371205	-0.1083139	0.0896235	0.227
Debt to Asset Ratio	0.0742945	0.0842907	0.0281039	0.0318664	0.378
Total Farmed Acres	0.0000289	0.0000625	0.0000109	0.0000236	0.644
Total 2013 Insurance Use	0.0578078	0.1146477	0.0218674	0.0433646	0.614
Farm Soil Zone: Brown	-0.0415811	0.2178575	-0.0157292	0.0823858	0.849
Farm Soil Zone: Dark Brown	0.1108129	0.1949098	0.041918	0.0737752	0.57
Farm Soil Zone: Dark Grey	-0.2614905	0.3386161	-0.0989159	0.1280787	0.44
Farm Soil Zone: Grey	**-0.5965822**	**0.3479842**	**-0.22567**	**0.13144**	**0.086**
Farm Soil Zone: Unknown	-0.5617715	0.4820302	-2.13E-01	1.82E-01	0.244
Total Farm Permanent Storage	7.44E-07	1.15E-06	2.81E-07	4.35E-07	0.517
Total Workers Employed - Full Time	**-9.75E-02**	**0.0530036**	**-0.0368765**	**0.0200977**	**6.60E-02**

88

4.6.2 Marginal Effects: Increase in Canola Forward Contract Use as of 2012

Table 4.3 shows the results of the probit regression and marginal effects for stated increase in use of forward contracts for marketing canola. For a stated increase in the use of canola forward contracts, the locus of control scale and all risk attitude scales were not found to be significant. The only experience effects to be significant were previous use of canola forward contracts for one or more years, in comparison to the base case of zero years of use. Use of canola forward contracts for one year previously is significant at the 1.0% level, with a positive marginal effect of 32.5%. Previous use of canola forward contracts for more than one year is significant at the 1.0% level as well, with a positive marginal effect of 22.9%.

The only control variables found to be correlated with a stated increase in canola forward contract use were soil zones. With black soil zones as the base zone, those who farmed brown, dark brown, or grey were statistically more likely to increase forward contract use for canola in 2012. Farming the brown soil zone is significant at the 1.0% level, with a positive marginal effect of 17.0%. Farming the dark brown soil zone is significant at the 0.1% level, with a positive marginal effect of 18.0%. Farming the grey soil zone is significant at the 1.0% level, with a positive marginal effect of 28.3%.

Table 4.3: Stated Increase in Canola Forward Contract Use Marginal Effects

	Coefficient	Std. Err. (Coef.)	Marginal Effects	Std. Err. (ME)	P>z
Locus of Control Scale	-0.1059228	0.0984872	-0.0295115	0.0274487	0.282
Risk Attitude Scale (Marketing Wheat)	0.3908962	0.338001	0.108909	0.0936075	0.245
Risk Attitude Scale (Marketing Canola)	-0.1581242	0.3268929	-0.0440555	0.0908676	0.628
Risk Attitude Scale (General Business)	-0.0231373	0.0905972	-0.0064464	0.0252478	0.798
Wheat Forward Contract Use 1 Year	0.0237995	0.2603322	0.0066309	0.0725187	0.927
Wheat Forward Contract Use > 1 Year	0.1526142	0.2632418	4.25E-02	7.33E-02	0.562
Wheat Futures Market Use 1 Year	0.4569001	0.3912356	1.27E-01	1.09E-01	0.243
Wheat Futures Market Use > 1 Year	0.9319815	0.5602168	0.2596627	0.1569269	0.098
Wheat Options Market Use 1 Year	-0.5594377	0.7313174	-0.1558669	0.2034023	0.443
Wheat Options Market Use > 1 Year	-0.9379634	0.7869311	-0.2613293	0.2195677	0.234
Canola Forward Contract Use 1 Year	**1.197262**	**0.4095374**	**0.333573**	**0.111599**	**0.003**
Canola Forward Contract Use > 1 Year	**0.8513756**	**0.3357184**	**0.237205**	**0.091216**	**0.009**
Canola Futures Market Use 1 Year	0.2940244	0.4425278	0.0819192	0.1233983	0.507
Canola Futures Market Use > 1 Year	-0.3047144	0.3689218	-0.0848976	0.1028902	0.409
Canola Options Market Use 1 Year	0.5974308	0.5836822	0.1664523	0.1628129	0.307
Canola Options Market Use > 1 Year	0.0631289	0.5026183	0.0175886	0.1400382	0.9
Primary Manager Years of Management	1.30E-02	8.96E-03	0.003621	0.0024947	0.147
Farm Manager Education: High School	0.2958818	0.4652186	0.0824367	0.1296878	0.525
Farm Manager Education: Trade School	0.7396853	0.5247971	0.2060863	0.145487	0.157
Farm Manager Education: College	0.5582154	0.4802721	0.1555264	0.1338036	0.245
Farm Manager Education: Undergraduate	0.1775594	0.4679511	0.0494704	0.1304154	0.704
Farm Manager Education: Graduate	0	(omitted)	0	(omitted)	
Yearly Marketing Workshop Hours	0.0030649	0.0049383	0.0008539	0.0013741	0.534
Marketing Advisor	0.0529873	0.2518806	0.014763	0.0701932	0.833
Debt to Asset Ratio	0.0702194	0.0917885	0.0195641	0.0255227	0.443
Total Farmed Acres	-0.000036	0.0000656	-1.00E-05	0.0000183	0.583
Total 2013 Insurance Use	0.0519892	0.1281656	0.0144849	0.0357175	0.685
Farm Soil Zone: Brown	**0.6023476**	**0.2396991**	**0.167822**	**0.066567**	**0.012**
Farm Soil Zone: Dark Brown	**0.6469102**	**0.2045108**	**0.180238**	**0.056762**	**0.001**
Farm Soil Zone: Dark Grey	-0.6956374	0.4944466	-0.193814	0.1361277	0.155
Farm Soil Zone: Grey	**1.078835**	**0.3904707**	**0.300578**	**0.108568**	**0.006**
Farm Soil Zone: Unknown	0.2084356	0.5294387	0.058073	0.1475009	0.694
Total Farm Permanent Storage	-3.66E-07	1.20E-06	-1.02E-07	3.33E-07	0.759
Total Workers Employed - Full Time	0.0301757	0.0533456	0.0084073	0.0148762	0.572

4.6.3 Marginal Effects: Increase in Futures Market use for all crops as of 2012

The results for the probit regression and marginal effects of a stated increase in the use of futures markets for all crops as of 2012 are shown in Table 4.4. These results found both the locus of control scale and previous experience as significant, but no significant effect was found for any of the risk attitude scales. Locus of control was found to be significant at the 5.0% level, with a positive marginal effect of 6.9%.

Using the canola futures market before 2012 was also found to significantly increase the probability of increased futures market use after 2012, in comparison to no use of the canola futures market previously. The effect of canola futures market use for one year increases probability of futures market use by 54.9% and is significant at the 0.1% level. Using canola futures for more than one year is also significant at the 0.1% level, and increases probability of futures market use for all crops by 39.8%.

The only control variable found to be significant for stated increase in the use of futures markets is a producer's debt to asset scale. It is significant at the 5% level, and the marginal effect is an increased probability of 5.2% as their reported debt level increases.

Table 4.4: Stated Increase of Futures Markets Use Marginal Effects (All Crops)

	Coefficient	Std. Err. (Coef.)	Marginal Effects	Std. Err. (ME)	P>z
Locus of Control Scale	**0.2722467**	**0.1102804**	**0.069306**	**0.02779**	**0.013**
Risk Attitude Scale (Marketing Wheat)	0.2279262	0.3480048	0.0580236	0.0884756	0.512
Risk Attitude Scale (Marketing Canola)	-0.3173265	0.3424438	-0.0807824	0.087139	0.354
Risk Attitude Scale (General Business)	0.1000065	0.0970155	0.0254588	0.024604	0.301
Wheat Forward Contract Use 1 Year	0.0644394	0.2861816	0.0164045	0.0728769	0.822
Wheat Forward Contract Use > 1 Year	-0.0673848	0.2921327	-0.0171543	0.0744005	0.818
Wheat Futures Market Use 1 Year	0.2507399	0.414263	6.38E-02	1.06E-01	0.546
Wheat Futures Market Use > 1 Year	0.0232829	0.5480789	0.0059272	0.1395109	0.966
Wheat Options Market Use 1 Year	0.9779124	0.6055771	0.248949	0.1554278	0.109
Wheat Options Market Use > 1 Year	-0.4374011	0.7534107	-0.11135	0.1916182	0.561
Canola Forward Contract Use 1 Year	0.1322213	0.4224665	0.0336598	0.107401	0.754
Canola Forward Contract Use > 1 Year	-0.090787	0.3366565	-0.0231118	0.0857104	0.787
Canola Futures Market Use 1 Year	**2.157141**	**0.4697329**	**0.549148**	**0.125156**	**0**
Canola Futures Market Use > 1 Year	**1.564596**	**0.3582416**	**0.398302**	**0.093407**	**0**
Canola Options Market Use 1 Year	-0.1238131	0.5612596	-0.0315193	0.1428475	0.825
Canola Options Market Use > 1 Year	0.0942348	0.4429707	0.0239895	0.1127222	0.831
Primary Manager Years of Management	-1.05E-02	9.47E-03	-0.0026792	0.0024028	0.265
Farm Manager Education: High School	-0.0541943	0.5012621	-0.0137964	0.1276958	0.914
Farm Manager Education: Trade School	0.0854777	0.5710697	0.0217602	0.1452308	0.881
Farm Manager Education: College	0.0309589	0.5310512	0.0078813	0.1351468	0.953
Farm Manager Education: Undergraduate	0.053225	0.5058279	0.0135496	0.1286942	0.916
Farm Manager Education: Graduate	-0.6355568	1.189612	-0.1617949	0.3007372	0.591
Yearly Marketing Workshop Hours	-0.0034265	0.0052953	-0.0008723	0.0013519	0.519
Marketing Advisor	0.0995392	0.2601417	0.0253399	0.0662857	0.702
Debt to Asset Ratio	**0.2023724**	**0.0987801**	**0.051518**	**0.024934**	**0.039**
Total Farmed Acres	0.0000801	0.0000687	0.0000204	0.0000176	0.246
Total 2013 Insurance Use	0.1459995	0.1344069	0.0371674	0.0340105	0.274
Farm Soil Zone: Brown	0.2659258	0.2540926	0.0676973	0.0644869	0.294
Farm Soil Zone: Dark Brown	0.2887928	0.2200312	0.0735185	0.0554965	0.185
Farm Soil Zone: Dark Grey	0.2450329	0.4647924	0.0623785	0.1183809	0.598
Farm Soil Zone: Grey	-0.2041115	0.4725854	-0.0519611	0.1201085	0.665
Farm Soil Zone: Unknown	0.4322526	0.5311031	0.1100394	0.1348531	0.415
Total Farm Permanent Storage	2.83E-07	1.29E-06	7.20E-08	3.29E-07	0.827
Total Workers Employed - Full Time	-0.0655378	0.0675312	-0.0166841	0.0171089	0.329

4.6.4 Marginal Effects: Increase in Options Market Use for all crops as of 2012

Table 4.5 shows the results of the probit regression and marginal effects for stated increase in use of options markets for all crops. For the variables of interest, locus of control is not found to be significant for a stated increase in the use of options markets for all crops. However, all risk attitude scales and several experience effects are found to be significant. The risk attitude scales toward marketing wheat and marketing canola are significant at the 10% level, while general business risk is significant at the 5% level.

Risk attitude toward marketing both wheat and canola is found to be significant in options market use; however, the results differ by crop type. Being rated higher on the risk attitude scale for marketing wheat, which means being more risk tolerant in wheat marketing, is found to have a positive marginal effect of 6.2% to the probability of increased options market use. This means that producers who are rated a full unit higher than their peers on the risk attitude scale for marketing wheat are 6.2% more likely to have increased their use of wheat options markets for all crops as of 2012. In comparison, the risk attitude scale toward marketing canola has a negative marginal effect of 7.2%. This implies that producers who are rated a full unit higher than their peers on the risk attitude scale for marketing canola are 7.2% less likely to increase their use of options markets for all crops as of 2012. These results are discussed further in Chapter 5. The general risk attitude scale toward business decisions has a positive marginal effect of 2.4% on increased options market use.

Use of canola futures markets and canola options markets are found to correlate with a stated increased use of options markets. Those producers who used canola futures markets for just one year previously were found to be 9.7% more likely to increase their use of options markets in comparison to those who did not. One year of canola futures market use was significant at the

10% level. Using canola options for more than one year was also found to be significant at the

10% level, and increases probability of a stated increase by 9.4%.

For the control variables, only use of a marketing advisor was found to be significant. Having a

marketing advisor was found to be significant at the 1.0% level, with a positive marginal effect

of 7.6%.

Table 4.5: Stated Increase in Options Markets Use Marginal Effects (All Crops)

	Coefficient	Std. Err. (Coef.)	Marginal Effects	Std. Err. (ME)	P>z
Locus of Control Scale	0.2414334	0.1616685	0.0134194	0.0101126	0.185
Risk Attitude Scale (Marketing Wheat)	**1.117**	**0.6329489**	**0.0620855**	**0.0367198**	**0.091**
Risk Attitude Scale (Marketing Canola)	**-1.30287**	**0.6169816**	**-0.0724166**	**0.038032**	**0.057**
Risk Attitude Scale (General Business)	**0.4252514**	**0.1518148**	**0.0236365**	**0.0119079**	**0.047**
Wheat Forward Contract Use 1 Year	-0.1413628	0.4100559	-0.0078573	0.0229829	0.732
Wheat Forward Contract Use > 1 Year	-0.4682527	0.4143726	-0.0260266	0.0253609	0.305
Wheat Futures Market Use 1 Year	1.16868	0.5046977	6.50E-02	3.93E-02	0.099
Wheat Futures Market Use > 1 Year	0.2686807	0.6943739	0.0149339	0.0396321	0.706
Wheat Options Market Use 1 Year	1.118686	0.6885559	0.0621793	0.0464522	0.181
Wheat Options Market Use > 1 Year	0.3837844	0.8652092	0.0213317	0.0486666	0.661
Canola Forward Contract Use 1 Year	1.067828	0.957665	0.0593524	0.0475833	0.212
Canola Forward Contract Use > 1 Year	1.023937	0.8888279	0.0569129	0.0420701	0.176
Canola Futures Market Use 1 Year	**1.752015**	**0.5773705**	**0.0973812**	**0.049981**	**0.051**
Canola Futures Market Use > 1 Year	0.8202328	0.4703387	0.0455905	0.0311478	0.143
Canola Options Market Use 1 Year	0.6487105	0.5749415	0.0360569	0.0347674	0.3
Canola Options Market Use > 1 Year	**1.685453**	**0.5390194**	**0.0936815**	**0.0531071**	**0.078**
Primary Manager Years of Management	-2.67E-02	1.35E-02	-0.0014859	0.0009649	0.124
Farm Manager Education: High School	-0.3196268	0.5362687	-0.0177656	0.0299891	0.554
Farm Manager Education: Trade School	-1.467016	0.8902276	-0.0815403	0.0562371	0.147
Farm Manager Education: College	-0.7549269	0.6269916	-0.0419607	0.036533	0.251
Farm Manager Education: Undergraduate	-0.7158988	0.5481301	-0.0397914	0.0332395	0.231
Farm Manager Education: Graduate	-0.2645447	0.9154009	-0.014704	0.0514962	0.775
Yearly Marketing Workshop Hours	-0.0089611	0.0078319	-0.0004981	0.0004668	0.286
Marketing Advisor	**1.373413**	**0.3609587**	**0.0763376**	**0.0382365**	**0.046**
Debt to Asset Ratio	-0.0413331	0.1465962	-0.0022974	0.0082335	0.78
Total Farmed Acres	-0.0001343	0.0001222	-7.46E-06	6.93E-06	0.282
Total 2013 Insurance Use	0.1986731	0.1955229	0.0110427	0.0113327	0.33
Farm Soil Zone: Brown	-0.0932962	0.3810914	-0.0051856	0.0213796	0.808
Farm Soil Zone: Dark Brown	-0.3498979	0.3228622	-0.0194482	0.0190845	0.308
Farm Soil Zone: Dark Grey	-0.3540709	0.6615192	-0.0196801	0.0384464	0.609
Farm Soil Zone: Grey	-0.6700937	0.7415057	-0.0372454	0.0438528	0.396
Farm Soil Zone: Unknown	0	(omitted)	0	(omitted)	
Total Farm Permanent Storage	2.07E-06	1.95E-06	1.15E-07	1.12E-07	0.305
Total Workers Employed - Full Time	-0.0556794	0.0834482	-0.0030948	0.0048252	0.521

4.7   Conclusion

This chapter used probit regressions to identify common attributes among producers who chose to increase use of forward marketing methods.   Of particular interest to this thesis are correlations between a stated increase in marketing method use with measures of locus of control, risk attitude, and previous experience. An internal locus of control was found to be correlated with a stated increase in futures market use. Having greater comfort with risk was found to correlate with a stated increase in options market use. Previous experience was also found to be significant in the choice to use a marketing method more frequently.

Chapter 5 discusses what can be inferred from these results. Each independent variable is analyzed, starting with variables of interest. Comparisons are then made between the findings in this thesis to the findings of previous literature.

Chapter 5: Discussion of Results

5.1 Introduction

This chapter expands on the findings in Chapter 4, where the results of probit regressions on a stated increase in marketing methods were presented. The dependent variable for each regression is true if a producer stated they increased their use of a forward marketing method after the CWB single desk was removed in 2012, and false otherwise. Four regressions were run: one for a stated increase in the use of forward contracts for wheat, one for a stated increase in the use of forward contracts for canola, one for a stated increase in the use of futures markets for any crop, and one for a stated increase in the use of options markets for any crop. Each independent variable is addressed in a sequential manner, and the implications of any correlations found are considered with respect to the previous literature.

5.2 Locus of Control

Having an internal locus of control is found to be significant in increasing use of futures markets. For each point a producer rates as more internalized on the locus of control scale, the probability of increased futures use increased by 6.9%. This suggests that the attributes of the futures markets appeal to producers who do not believe that marketing outcomes are dependent on luck. Previous literature provides suggestions as to what these attributes could be.

As discussed in Chapter 2, selling a futures contract is a method to protect the value of farm produced commodities from price risk due to fluctuations on futures markets. Producers who responded to this survey indicated that selling of futures contracts is their primary usage of futures markets, as displayed in Table 3.10. This indicates that the producers sampled are mainly using futures as a hedge and not for speculation. This suggests that producers with internal locus

of control are locking-in prices for commodities prior to pricing them at elevators, which is a prospective farm strategy and similar to the findings of Kaine et al. (2004). For those using futures markets based in a different currency, such as the wheat markets in the US, this also indicates a willingness to be exposed to FOREX risk. Perhaps those with an internal locus of control consider the FOREX controllable as well.

There is an element of individualistic action in hedging through futures markets, as elevators often offer similar pricing through forward contracting. The choice to hedge in a manner that does not involve a commitment of delivery to a specific elevator company could be a similar aspect to the findings of Mueller and Thomas (2000) who suggested a high level of individualism associated with internal locus of control. Finally, previous research has found managers with an internal locus of control are likely to maintain lower levels of financial liquidity within their enterprises (Begly and Boyd, 1987). The finding of internal locus of control correlated to increased futures market use supports previous research, as the act of hedging through futures requires the commitment of some of the farm's liquid financial assets to maintaining the margin requirements of the brokerage account and covering fees for the opening and closing of positions. This commitment may be even greater if the producer is using futures markets in a currency other than their own, due to FOREX risk.

5.3   Risk Attitude

This thesis measures a producer's risk attitude on three separate scales: marketing wheat, marketing canola, and general business risk. A greater scale value indicates that the producer has a higher tolerance for a specific type of risk. All three scales are found to be significant, but only for the dependent variable of a stated increase in use of options markets in 2012.

The probability of increased options market use after August 2012 increased for producers who stated they are more risk tolerant with marketing wheat or general business risk. For marketing wheat, each point on the scale increases this probability by 6.2%. For general business risk, each point on the scale increases this probability by 2.4%. However, producers who indicated a greater risk preference for marketing canola are found to be less likely to increase their use of options markets. Each additional point of risk tolerance for marking canola is associated with a 7.2% decrease in the probability of increasing options market use as of 2012. While these results at first seem contrary, the lack of Canadian wheat option market availability previous to 2012 provides a potential explanation.

Producers who indicated greater comfort with risk in marketing both wheat and canola are simultaneously more likely to increase their use of options markets when marketing wheat and less likely to increase their use of options markets when marketing canola. However, if an assumption is made that the producers who are more tolerant of risk were not using options for wheat prior to 2012, but were using options for canola, the results seem obvious. Under this assumption, producers with greater tolerance for risk are already using options markets for their canola and are less likely to state an increase in use as they were already using them.

One potential problem with this assumption is that producers had the opportunity to use options markets before the wheat market opened through the commodity markets in the United States. If producers were looking to use options in their wheat marketing, they could have done so prior to 2012. It is possible that producers were unwilling to take on the additional risk from currency exchange that would have applied in US markets, or that the CWB marketing may have inhibited option use in some manner. This thesis did not consider or ask producers about why they increased option market use.

Potentially it is the increased opportunity to forward contract wheat that is leading to increased options market use. Once price and basis are established through a forward contract, the producer may wish to re-enter the future markets again. An option allows them to try to capture futures market movement while only risking the premium.

As these results indicate a greater probability of options market use with higher general business risk tolerance, then this suggests that producers view using options markets as risky. This finding is further motivated by the findings in Chapter 3 with producers stated use of options appearing speculative. While specific to a different marketing method, this result is similar to the findings of Goodwin and Schroeder (1994) that an increased preference for business risk correlates with an increased adoption of forward market use. If the options market is the producer's choice for speculation, then they would be buying calls or selling puts when expecting the market will increase, and buying puts or selling calls when expecting a market decrease. This thesis did ask producers their yearly options market use, shown in Table 3.10, and there is no clear dominant use. However, producers did state that they were buying and selling both put and call options. If price risk hedging was occurring, it would be expected that buying put options would be prevalent. This would allow the producer to gain value in the put as commodity futures dropped.

5.4   Marketing Experience

5.4.1   Marketing Decision: More of the Same

Marketing experience is gauged on a producer's use rate over the previous three years (2010 to 2012). Categorical variables were created for producers who had used a marketing method for only one year or for multiple years, both of which were compared to a base case of zero years of experience. Previous work has suggested that knowledge of marketing methods, and comfort

100

with their use is correlated with decisions on which marketing methods producers use (Davis et al., 2005; Vergara et al., 2004). A similar result was found within all probit regressions in this thesis. For each marketing method, previous use was found to be positively correlated with a stated increase in use as of 2012.

As the dependent variables for forward contract use is differentiated by crop type, a clear effect of crop specific marketing experience is apparent. Previous use of wheat forward contracts has a significant positive effect on a producer choosing to increase their use of wheat forward contract use in 2012. Use for one year increases the probability by 40.6%, while use for more than one year increases the probability by 15.5%. Similarly, previous use of canola forward contracts has a significant positive effect on a producer choosing to increase their use of canola forward contracts as of 2012. Use for one year increases the probability by 32.5%, while use for more than one year increases the probability by 22.9%. It is interesting that for both wheat and canola that the effect of use for one year has a greater effect than use for more than one year. As the dependent variable is based on a stated increase in use, it is possible that producers who have multiple years of use may have already increased the amount of forward contracts in their marketing. Therefore, they would not perceive their use of forward contracts as increasing as of 2012. Their usage would have increased previous to 2012, and therefore would consider their use rate as not changing.

The dependent variable for stated change in use of futures contract use in 2012 was not made crop specific due to concerns of potential low usage found in previous research (Davis et al., 2005; Goodwin and Schroeder, 1994; Musser et al., 1996; Sartwelle et al., 2000). However, independent variables on annual futures contract use were able to be separated into wheat and canola. This thesis finds no correlation between previous use of wheat futures markets and a

101

stated increase in the use of futures markets. However, this thesis finds correlation between the previous use of canola futures markets and a stated increase in futures market use. Use of canola futures for one year increases probability by 54.9%, while more than one year of use is found to increase probability by 39.8%. If producers who are increasing futures market use do so because they are comfortable with their use, then this result suggests that the majority of producers' futures market use previous to 2012 was in canola markets.

The dependent variable for options market use was not made crop specific for the same concerns in futures market use. Independent variables for annual options market use was separated between wheat and canola, and again the use of wheat options markets was not found to be significant. Canola options market use was found to increase the probability of further options market use by 9.4%, but only if the producer indicated they had used them for more than one year between 2010 and 2012. This leads to options market use having a similar conclusion as futures markets, which is if producers are increasing use due to comfort with the marketing method then their previous use was in canola markets.

5.4.2 Cross Crop Experience Effects in Forward Contract Use

Figure 3.3 shows that forward contracting for wheat had the greatest number of responses stating increased use in 2012, while increased forward contracting for canola was second. While noting that previous forward contract use for wheat increased probability of use in comparison to no experience, of particular interest is the finding that so too does the use of canola forward contracts. Probability of stated increase in the use of wheat forward contracts as of 2012 is found to increase by 29.0% if canola forward contracts were used for only one year, while more than one year of use is found to increase probability by 27.4%. This finding is noteworthy because the relationship is not present in reverse, which may make sense given the changes that occurred

in the wheat marketing environment (but not the canola marketing environment) in 2012. Any experience with wheat forward contracts has no significant correlation with a producer choosing to increase their use of canola forward contracts. This result suggests that producers are making their decisions to increase wheat forward contract use in 2012 based on their previous experience in forward contracting canola. This suggests that, despite potential differences in the factors driving the markets, a cross crop transfer of knowledge has occurred and producers are marketing their wheat based on their marketing experience with canola.

5.4.3   *Trying out Options with Futures*

Limited experience with futures markets was found to have a correlation with increased options market use. Experience using futures markets for one year between 2010 and 2012 for both wheat and canola was found to correlate with increased probability of options market use, with an increase of 6.5% and 9.7% respectively, but experience using futures for either crop for more than one year was not found to be significant. This suggests that producers are trying out new marketing methods. Those who are new to futures markets use are more likely to try out options markets as well. This relationship is not present in reverse, as options market use for any crop is not significant for increased futures market use.

5.5   Control Variables

The following sections discuss each attribute that is significantly correlated to a dependent variable in any of the regressions. Each regression includes a total of 18 control variables covering 10 attributes which were suggested as significant by previous literature, as discussed in Chapter 2. Only nine of the variables, relating to six of the attributes, are found to have significant correlation within any regression.

5.5.1   Primary Manager Years of Experience

Experience as primary manager was found to be significant for only a stated increase in the use of wheat forward contracting. It is worth noting that the estimated effect of additional management experience is quite small at an increased probability of just 0.8% for every year of experience. This might indicate the effect of information diffusion between producers over time (Rogers, 1976).

It is important to note that the dependent variables of this thesis are focused around an exogenous shock, differentiating it from the majority of previous marketing literature. This thesis finds that more years of farming experience relates to a greater likelihood to state an increase in use of forward contracts for wheat after the wheat market opened. This implies that less experienced producers either did not increase their use of wheat forward contracts, or were already using forward contracts for wheat to such an extent that they did not perceive a change under the new policies.

The findings in this thesis differ from previous literature which found mostly negative relationships between marketing method use and farmer experience or age (Davis et al., 2005; Goodwin and Schroeder, 1994; Musser et al., 1996; Shapiro and Brorsen, 1988; Vergara et al., 2004; Wolf, 2012). It is similar to the findings of Katchova and Miranda (2004) who found a producer's age increases the total forward marketing of soybeans by only 1.0%.

5.5.2   Farm Manager Formal Education

Categorical variables were used to test if different types of formal education had a significant correlation with stated increase in use of marketing methods as of 2012. The education levels

are being compared to a base case of a producer whose highest education is less than the equivalent of completing high school.

This thesis found that a producer with a graduate degree (MSc, PhD) is 46.9% less likely to increase their use of wheat forward contracts. A potential explanation of this result is that producers with graduate educations were already using forward contracts for wheat and therefore would not consider their use after 2012 as an increase. However, it should be cautioned that this survey found a very small sample of producers with a graduate degree; only 8 of the 295 responses, as shown in Table 3.12. As such, it is possible the marginal effect of a graduate degree is being overstated.

5.5.3   *Marketing Advisor*

Producers were asked if they hired consultants on the farm to help them with their marketing decisions. Those producers who indicated having a marketing advisor are found to be 7.6% more likely to have increased their use of options markets as of 2012. This finding supports positive effects of advisory service on marketing method use from previous literature (Davis et al., 2005; Katchova and Miranda, 2004)

The implications of this finding are unclear. As the findings from producer risk attitude scales suggest that the options market is viewed as risky, having an expert on hand to provide explanations of their function and how they fit a farm's marketing plan may make options market use more likely. Alternatively, this finding may suggest that advisors are advocating options market use.

5.5.4   *Debt to Asset Ratio*

Producers were asked to rate their debt to asset ratio on a scale of 1 to 5, with higher numbers indicating higher ratios of debt. This thesis suggests that for each point producers move up the scale, they are 5.2% more likely to have increased futures market use as of 2012. This finding is similar to that of previous literature (Goodwin and Schroeder, 1994; Katchova and Miranda, 2004; Musser et al., 1996).

The assumption is that as producers increase their financial leverage, the use of forward marketing will increase in order to mitigate risks to income that could result in insolvency. This assumption is supported by Table 3.10 which showed the majority of producers sold futures, indicating hedging behavior. As debt was not found to increase use of forward contracts or options markets, potential answers lie in the different attributes between marketing methods.

As described in Chapter 2, option values are derived from the values of futures markets and the time remaining till futures expiry date. This means that changes in option values may differ from changes in their underlying futures which would provide problems in using options as a hedge. Another potential issue is liquidity, as daily traded futures volumes are higher than that of options.

Between futures and forward contracts, the fundamental difference is how the contract can be satisfied. A forward contract is satisfied by the delivery of grain, while a sell position using futures contracts allows a position closure through the purchase of an identical contract. A counterparty who desires grain may have financial penalties built into the contract, which would increase yield risks. A debt laden farm enterprise may be sensitive to these potential additional costs and would therefore choose to contract through the futures markets.

5.5.5 *Farm Soil Zone*

The majority of farmers surveyed have farms located in the black soil zone, as displayed in Figure 3.6. Soil zones are divided into native grassland, or transitional land between grassland and forested area. Grassland soils are classified as brown, dark brown, or black. Transitional soils are classified as grey or dark grey. Those soils with darker color classification have greater mean annual precipitation, greater organic matter, and higher yield potential (Pennock et al., 2011). As most provinces surveyed have multiple soil zones, this variable attempts to find if there are locational attributes influencing producers' marketing decisions. Categorical variables were created for each soil zone, including an additional category for responses which did not know their soil zone, with farming the black soil zone used as the base category.

Producers in the grey soil zone are found to be 23.0% less likely to state they increased their use of wheat forward contracts in 2012 than producers who farmed black soil zones. However, it is unclear if this is due to lower yield potentials, or if the grey soil zone farmers were already extensively using wheat forward contracts, and therefore would not be changing their marketing methods after 2012.

Producers in the brown, dark brown, and grey soil zones are found to be more likely to state an increase in their use of canola forward contracting as of 2012 than those producers who farm in the black soil zone. Probability increases for farming in brown, dark brown, and grey soil zones are 17.0%, 18.0%, and 28.3% respectively. While this thesis did not directly ask producers for reasons for change, several possibilities exist. As the brown, dark brown, and grey soil zones typically have lower yield potential then the black soil zone, due to lower organic matter and lower precipitation, it is possible that varietal improvements have decreased the perception of yield risk in producing canola. Reduced yield risk could lead to an increased use of forward

contracting. Alternatively, the answer to increased forward contracting of canola could come from a logistical impact due to the opening of the Canadian wheat market. If producers expected that an open market would lead to greater demand for wheat, demand which could decrease the number of opportunities to sell canola, then increased use of forward contracting could be a reaction by producers to ensure regular delivery. Reasons for needing regular delivery could include managing cash flow within the farm enterprise, or concerns regarding potential quality loss associated with long term canola storage. Neither of these potential concerns were a focus of this thesis, and may provide opportunities for further research.

5.5.6 *Full Time Employees*

Farms with many full time employees are found to be less likely to state an increase in wheat forward contracting as of 2012. Each additional full time worker on a farm decreases this probability by 5.8%.

Farms with full time workers have wage commitments, a strong incentive for consistent cash flow. This result could be due to farms with full time employees already using forward contracts for wheat previous to 2010. Use of forward contracts would help schedule movement of grain, which in turn would provide cash flow.

5.6   Conclusion

In summary, probit regressions were run on producers' stated increase in the use of forward marketing methods as of 2012. These marketing methods are wheat forward contracts, canola forward contracts, futures markets for all crops, and options markets for all crops. The main independent variables of interest were producers' locus of control, risk attitude, and human capital through previous experience in using forward marketing methods. Previous experience

was found to increase the probability of a stated increase in use for all marketing methods. Internal locus of control was linked to an increased probability of futures market use. Greater risk appetite for marketing wheat or for general business risk was found to increase probability in options market use, while greater risk appetite for marketing canola was found to decrease the probability of options use. Several control variables were also found to be significant. Producers in brown, dark brown, and grey soil zones were found to be more likely to state an increase in canola forward contracting than producers in black soil zones. Higher debt levels were found to increase the probability of futures market use. Producer age was only found to be a factor in increasing options market use, as an increased number of years managing a farm was found to decrease the probability of a stated increase in the use of options markets. However, there are suggestions that individual education may increase the use of options markets, as employing a marketing advisor was found to have a positive correlation with a stated increase.

This chapter focused on answering the third question of this thesis by trying to identify common attributes among the producers who chose to increase their use of forward marketing methods as of 2012. To find producers who had increased their use, the survey included questions that asked if they had increased their use of specific marketing methods in 2012, after the removal of the CWB single marketing desk for wheat. The marketing methods of interest are wheat forward contracts, canola forward contracts, futures markets with no crop specified, and options markets with no crop specified. Producers' responses were used as dependent variables and, due to their dichotomous nature, probit regressions were run against independent variables suggested by previous relevant literature. The significance of the independent variables were stated and comparisons were made between this thesis's findings and previous research.

One of the attributes of interest for this thesis is a producer's locus of control. This attribute represents a producer's belief that their actions impact the outcome of events. These results suggest that producers with an internal locus of control have a higher probability of futures market use after the changes to the Canadian wheat market in 2012. No correlation is found between locus of control and increased use of any other marketing methods. This thesis finds that locus of control does not correlate with forward contracting, this suggests that internal locus producers are choosing to hedge without involving a grain movement company, which could support previous findings of individualistic behavior (Mueller and Thomas, 2000). This finding also supports previous research which suggests that an internal locus of control increases the probability of a prospective farm strategy (Kaine et al., 2004).

A producer's risk attitude is another attribute of interest for this thesis. Previous work has suggested that individual's risk tolerance varies by subject (Tversky and Kahneman, 1981). This thesis frames risk around three different subjects: the marketing of wheat, the marketing of canola, and taking risks with the farm enterprise. All three measures of a producer's risk tolerance are found to be significantly correlated with options market use, but none of the other marketing methods. This result again highlights the importance of framing, as increased tolerance to wheat marketing risk and to general business risk are found to increase likelihood of options market use, while increased tolerance to canola marketing risk is found to have a negative correlation. The results suggest that producers find options markets as risky, and that canola options use has been prevalent among risk tolerant producers.

The last main attribute of interest explored by this thesis is previous experience with the use of marketing methods and the impact it has on producers' future marketing decisions. The results of these regressions support previous research that suggests producers are more likely to use

marketing methods that they understand and with which they are comfortable (Davis et al., 2005; Vergara et al., 2004). This thesis finds a significant increase in the probability that a producer increases their use of a marketing method as of 2012 if they used the same marketing method previously between the years of 2010 to 2012. For futures markets and options markets use, the results suggest that the dominant market used previously is for canola. Use of canola forward contracting in the previous time frame is also found to increase probability of wheat forward contracting, suggesting a cross crop transfer of marketing knowledge. Wheat forward contracting experience is not found to effect changes in the forward contracting of canola, suggesting that this effect is not bilateral. Similarly, wheat futures market use is found to increase probability of canola forward contracting. However, canola futures market use is not found to have any significant effect on wheat forward contract use.

Several control variables were also included, as previous literature suggested they might have a significant effect on producers' marketing decisions. Managerial experience is found to have a small positive effect on wheat forward contracting and no effect on other marketing methods. This result is similar to the results of Katchova and Miranda (2004), and may suggest an information diffusion effect where collecting experiences from neighbors effect marketing decisions (Rogers, 1976).

Education was found to be correlated with a change in marketing methods in a comparison between producers who hold a graduate degree (MSc or PhD) and producers who had not completed high school. While this finding suggests that producers with advanced education have been using forward contracting for wheat previous to 2012, it is suspect due to the very small sample of producers with graduate degrees in this sample. Education was also found to have an effect on producer marketing decisions when it is leased. Producers who hired marketing

111

advisors are more likely to increase their use of options markets, a result similar to findings in previous literature (Davis et al., 2005; Katchova and Miranda, 2004).

Several of the control variables focus on farm enterprise attributes and are found to have significant effects on marketing decisions. The debt load of a farm is found to have a positive correlation with increased use of futures markets. Farming in a grey soil zone is found to significantly decrease the probability of increasing wheat forward contracting, but is found to increase the probability of increasing canola forward contracting. Farming in brown and dark brown soil zones also are found to increase the probability of additional forward contracting for canola. Finally, additional full time employees are found to decrease the likelihood of increasing wheat forward contracting, however this is surmised to be due to usage already being extensive to maintain the cash flow requirements of salaried labour.

Several control variables were found to have no significance in any of the regressions, despite their significance in previous literature. Producers were asked to report how many hours a year they spent at marketing workshops. Despite this being a specialized form of education for building internal human capital, this variable was not found to significantly impact producers' marketing decisions for any marketing method. Insurance use was also insignificant, despite its potential for minimizing the financial effects of yield risk on the farm enterprise. Farm size was also found to have no effect on marketing method use, despite previous literature suggesting benefits when hedging with futures (Shapiro and Brorsen, 1988). Farm grain storage was also found to be insignificant, suggesting that farm capitalization has no effect on marketing, or that grain storage is a poor proxy.

Chapter 4 and 5 have addressed if there are common attributes among the producers who increased their use of marketing methods after the CWB lost its single desk in 2012. With these probit regression results, several similar attributes have been identified, and the third question of this thesis is answered. All three questions are restated in Chapter 6, and the findings of this thesis are presented in an abridged format. Areas of further study are suggested, and implications of these results are presented.

Chapter 6: Conclusions

This thesis seeks to add to the general body of economic literature on producer marketing. The motivation behind this thesis is the fundamental change in the western Canadian grain markets due to the removal of the CWB's single desk marketing of wheat in August, 2012. This change has radically altered the marketing environment for wheat in Canada and allows for a direct comparison to marketing literature from the United States of America.

A survey was conducted to collect primary data from grain farmers located in Alberta, Saskatchewan, and Manitoba. This survey was delivered to producers over the internet, and was administered by a third party. A total of 516 responses were collected, of which 295 were considered complete and usable.

This thesis asked if producers in the Canadian prairie have changed their use of forward contracts after the removal of the CWB single desk resulted in the opening of the Canadian wheat market in 2012. Producers were asked about changes in their forward contract use for wheat, and about their change in use for canola to provide a comparison. Responses indicate that 85.1% of producers use forward contracts in their wheat marketing. For changes in use after 2012, 39.7% of producers stated an increase, while 2.4% stated a decrease. For comparison, forward contracting of canola was found to be more prevalent than in wheat, as it is used by 88.8% of producers. However, fewer producers changed their use of forward contracts for canola in 2012, as 23.7% of producers stated an increase in their use, while 0.7% stated a decrease.

The percent of producers who reported using forward contracts is greater than any previous literature reviewed for this thesis. As shown in Table 3.7, the previous highest use rate was

74.1% (Musser et al., 1996). These findings are either an indication of increased usage of forward contracting by producers over the last two decades, or that western Canadian producers are greater users of forward contracting. As all Canadian grain markets are now open, this is a potential area of further research.

This thesis also asked if producers in the Canadian prairie have changed their use of futures and options markets. No crops were specified, as previous literature had highlighted concerns over low usage (Davis et al., 2005; Goodwin and Schroeder, 1994). This thesis found futures markets to be used by 62.0% of respondents. Changes in futures market use in 2012 was stated to increase by 23.4% of respondents, while 1.7% of respondents stated a decrease. Options markets are used by 42.4% of respondents. An increase in options use in 2012 was stated by 14.9% of respondents, while 0.3% of respondents stated a decrease.

This thesis found a higher percent of producers who reported use of futures markets than any of the previous literature from the United States, and the second highest rate of options market use. As with forward contracts, it is unclear if there has been greater acceptance of futures and options markets for farm marketing in the time since previous research, or if western Canadian producers have higher use rates than their US counterparts, or if these results are biased due to this survey's sample being drawn through existing Ipsos contacts, as detailed in Chapter 3. Further research in this area is required to confirm these results.

The final question asked by this thesis concerned identifying common attributes among the producers who chose to increase use of forward marketing methods after the removal of the CWB in 2012. Using probit regressions, a number of common attributes were found. For all marketing methods, producers were more likely to increase their use if they had previous experience. This finding is similar to previous literature that finds producers tend to use

marketing methods with which they comfortable and knowledgeable (Davis et al., 2005; Vergara et al., 2004).

Several attributes were found to affect a producer's use of wheat forward contracts. Those who increased their use were likely to have previous experience in forward contracting canola. This relationship is not present in reverse. Increased use was also identified for producers who have been primary farm managers for many years.

Attributes were also identified among those producers who were less likely to increase their use of wheat forward contracts. Producers with advanced university-level education are less likely to state an increase in using wheat forward contracts then producers who did not complete high school. Similarly, producers who farm in the grey soil zones are less likely to state an increase in wheat forward contracts from 2012 onwards than those producers who farm the black soil zones. It is unclear why these attributes would lead to producers choosing not to use forward contracts, and it is possible that these attributes are shared among those who already used wheat forward contracts previous to the changes in 2012. Similarly, farms with multiple full time staff were found less likely to increase their use of wheat forward contracts in 2012, perhaps due to already using this marketing method to meet salary commitments.

Indicators of increased canola forward contract use, besides previous forward contracting, are long term experience using wheat futures. Also, farms in the brown, dark brown, and grey soil zones were found more likely to increase their use of canola forward contracts than those who farmed the black soil zone, as of 2012.

Producers were also asked about their change in use of futures markets after the opening of the Canadian wheat market in 2012. Producers were asked about changes in their futures market use

for all crops. Several attributes were identified with increased futures market use. Those producers who have an internal locus of control, meaning they expect that their actions have an effect on the outcome of events, were found more likely to use futures markets. This implies that producers view futures markets as providing the most control for their marketing. Farm debt was also found to be an indicator, with higher debt loads increasing the likelihood of futures markets use.

Those producers who had a greater tolerance for risk were more likely to use options markets. This finding indicates that producers view options markets as risky. Producers who use a marketing advisor are more likely to use options markets. There are also indications that some producers are trying a variety of marketing methods, as those producers who had limited experience using futures markets were also more likely to increase their use of options markets.

6.1   Implications of Results

With the removal of the CWB, the responsibility for managing price, yield, and basis risk for all crops falls to the producer. The results of this thesis provide suggestions on how to increase producers' use of forward contracts, futures markets, and options markets. Using these marketing methods will provide increased opportunities for price risk management practices. Parties who may be interested in seeing producers succeed in managing price risk include the Canadian Government, banks and lending institutions, and grain export companies.

This thesis found a correlation between experience effects with forward marketing methods and a stated increase in their use after 2012. These results have also suggested that previous use of marketing methods in one crop can lead to an increased use for others, such as the finding that increased wheat forward contracting is correlated to previous use of canola forward contracting.

Producers may be able to gain experience in forward contracting without risking their money through market simulations. These simulations could run in real time throughout the year and allow producers to try marketing strategies using forward contracts, futures markets, and options markets. This allows the producer to see how the marketing method has worked without risking any actual money or incurring the transaction costs associated with markets, such as brokerage fees and a margin account. These simulations are already available online to students and the public, which should decrease implementation costs.

Existing marketing education workshops and seminars may need to include more interactive elements. Simulations which compress a year of marketing decisions into a few hours could allow producers to immediately see the effects of the marketing methods. This could provoke further discussion, which may lead to additional education opportunities if an educator is also present.

This thesis also found that the use of a marketing advisor is correlated with increased options market use. This finding may suggest that producers benefit from having personal tutoring in marketing. Due to the potential benefits from personal tutoring, this thesis suggests holding marketing workshops or seminars with size limits that allow for dedicated personal interactions from the educator. Personalized education may be required to uncover what prevents a producer from trying forward marketing, and once that is overcome, these findings suggest that forward marketing use will continue.

6.2　Recommendations for Further Research

As shown in Table 3.7, producers in the Canadian prairie are actively using forward marketing methods. Further research should look to expand to a representative sample to confirm if the usage rates of this thesis are accurate.

This thesis also did not have the time or resources to drive deeply into producers' marketing history. Preliminary responses indicated that producers' ability to recall marketing choices is accurate to the previous year, and that data from years previous requires reference to farm records. Further research into changes in producer marketing method use should be prepared to collect annualized data for accurate results.

This thesis also introduced several biases, as discussed in Chapter 3. This thesis limited respondents to a minimum farm size of 1000 acres. Future research should include producers from a greater variety of farm sizes. The potential bias due to sampling using Ipsos in a solely online format is another limitation on these findings. While this method was convenient for this thesis, further research should attempt a more randomized sampling method. A more accessible method such as a paper survey may also add to the robustness of future results.

Finally, given that this thesis only examines the years 2010 through 2012, it is possible that producers' stated change in marketing is temporary rather than a long term shift in behavior. The opening of the Canadian wheat markets is a fundamental change to a generation of producers, and the stated changes in marketing method use may be reactionary. Given time, some of these producers may decrease their usage of specific marketing methods. Further research should attempt to distinguish between those producers who have increased their use of marketing methods permanently from those who have not, as this may change which attributes are identified as significant to increased use.

References

Ajzen, I. (1991). The Theory of Planned Behavior. *Orgnizational Behavior and Human Decision Processes*, *50*, 179–211.

Alberta Agriculture and Rural Development. (2006). Understanding the Canola Futures Contract. Retrieved May 24, 2015, from http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/sis10948

Arrow, K. J. (1973). Higher education as a filter. *Journal of Public Economics*, *2*(3), 193–216.

Bank of Canada. (2016). Daily Exchange Rates: 10 Year Lookup. Retrieved June 7, 2016, from http://www.bankofcanada.ca/rates/exchange/10-year-lookup/

Barkley, A. P., & Schroeder, T. C. (1991). Forward Contracts and Risk Mitigation in Fed Cattle Markets. *Selected Paper, American Agricultural Economics Association Annual Meetings, Manhattan, KS*.

Becker, G. S. (1971). *Economic Theory* (1st ed.). New York: Alfred A. Knopf, Inc.

Becker, G. S. (1976). *The Economic Approach to Human Behavior* (1st ed.). Chicago: The University of Chicago Press.

Begly, T., & Boyd, D. (1987). Psychologial characteristics associated with performance in entrepreneurial firms and small business. *Journal of Business Venturing*, *2*(2), 79–93.

Bernoulli, D. (1738). Specimen theoriae novae de mensura sortis. *Commentarii Academiae Scientiarum Imperialis Petropolitanae*, *5*, 175–192.

Bodie, Z., Kane, A., Marcus, A. J., Perrakis, S., & Ryan, P. J. (2008). *Investments* (6th Canada). McGraw-Hill Ryerson Limited.

Brockhaus, R. H. (1980). Risk taking propensity of entrepreneurs. *Academy of Management Journal*, *23*(3), 509–520.

Budson, A. E., & Price, B. H. (2005). Memory Dysfunction. *New England Journal of Medicine*, *352*, 692–699.

Campbell, B. (2013). Earnings Effects of Entrepreneurial Experience: Evidence from the Semiconductor Industry. *Management Science*, *59*(2), 286–304.

Cargill Aghorizons Canada. (2016). Grain Contracts. Retrieved May 9, 2016, from https://www.cargillag.ca/sell-grain/grain-contracts

Chen, M. (1996). Competitor Analysis and Interfirm Rivalry: Toward a Theoretical Integration. *The Academy of Management Review*, *21*(1), 100–134.

Chuang, Y., & Lee, C. (2004). Industry-Specific Human Capital and the Wage Profile: Evidence from Taiwan. *Review of World Economics*, *140*(1), 110–124.

CIGI. (1993). Chapter A-3: Canadian Wheat Board. In *Grains & Oilseeds: Handling, Marketing, Processing Vol I* (4th ed., pp. 105–112). Winnipeg: Canadian International Grains Institute.

CME Group. (2016a). Chicago SRW Wheat Futures. Retrieved January 1, 2016, from http://www.cmegroup.com/trading/agricultural/grain-and-oilseed/wheat_contract_specifications.html

CME Group. (2016b). CME Timeline. Retrieved June 6, 2016, from

http://www.cmegroup.com/company/history/timeline-of-achievements.html

CME Group. (2016c). KC HRW Wheat Futures. Retrieved January 1, 2016, from

http://www.cmegroup.com/trading/agricultural/grain-and-oilseed/kc-

wheat_contract_specifications.html

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*,

16(3), 297–334.

Davis, T. D., Patrick, G. F., Coble, K. H., Knight, T. O., & Baquet, A. E. (2005). Forward

Pricing Behavior of Corn and Soybean Producers. *Journal of Agricultural and Applied

Economics*, *37*(1), 145–160.

Driver, H. C., & Onwons, S. O. (1986). Profiles in Management and Performance for

Assessment of Information Needs. *Canadian Journal of Agricultural Economics*, *34*, 155–

176.

Ewing, M. T., & Napoli, J. (2005). Developing and validating a multidimensional nonprofit

brand orientation scale. *Journal of Business Research*, *58*(6), 841–853.

Goodwin, B. K., & Schroeder, T. C. (1994). Human Capital, Producer Education Programs, and

the Adoption of Forward-Pricing Methods. *American Journal of Agricultural Economics*,

76(November), 936–947.

Government of Saskatchwan. (2015). Saskatchewan Cash Prices ($ per tonne). Retrieved

October 1, 2015, from http://www.agriculture.gov.sk.ca/Default.aspx?DN=99944486-a852-

4501-93ad-3f6641407046

Greene, W. H. (2012). *Econometric Analysis*. (Pearson, Ed.) (7th Editio). New York University.

Guerin, L., & Guerin, T. (1994). Constraints to the adoption of innovations in agricultural

research and environmental management: a review. *Australian Journal of Experimental

Agriculture*, *34*(4), 549.

Harris, K. S., & Baker, C. B. (1981). Does Hedging Increase Credit for Illinois Crop Farmers?

North Central Journal of Agricultural Economics, *3*(1), 47–52.

Heifner, R. G. (1972). Implications of Hedging for the Agricultural Lender. *Agricultural Finance

Review*, *33*, 8–12.

Hines, J., Hungerford, H., & Tomera, A. (1986). Analysis and synthesis of research and

responsible environmental behaviour: a meta-analysis. *Journal of Environmental Education*,

18, 1–8.

Intercontinental Exchange. (2007). *Canola Brochure*. Retrieved from

https://www.theice.com/publicdocs/ICE_Canola_Brochure.pdf

Intercontinental Exchange. (2013). ICE Milling Wheat Futures & Options. Retrieved January 1,

2016, from

https://www.theice.com/publicdocs/futures_canada/ICE_Milling_Wheat_white_paper.pdf

Intercontinental Exchange. (2015). ICE Futures Markets Canada. Retrieved January 1, 2015,

from https://www.theice.com/futures-canada

Intercontinental Exchange. (2016a). Canola Options. Retrieved June 20, 2004, from

https://www.theice.com/products/250/Canola-Options

Intercontinental Exchange. (2016b). Milling Wheat Futures Data. Retrieved June 20, 2004, from https://www.theice.com/products/3912639/Milling-Wheat-Futures/data

Jayas, D. S., & White, N. D. G. (2003). Storage and drying of grain in Canada: Low cost approaches. *Food Control*, *14*(4), 255–261.

Just, D. R., Wolf, S. A., Wu, S., & Zilberman, D. (2002). Consumption of Economic Information in Agriculture. *American Journal of Agricultural Economics*, *84*(1), 39–52.

Kaine, G., Sandall, J., & Bewsell, D. (2004). Personality and Strategy in Agriculture. *20th Annual AIAEE Conference*, (1), 790–801.

Katchova, A. L., & Miranda, M. J. (2004). Two-Step Econometric Estimation of Farm Characteristics Affecting Marketing Contract Decisions. *American Journal of Agricultural Economics*, *86*(1), 88–102.

Knight, T. O., Lovell, A. C., Rister, M. E., & Coble, K. H. (1989). An Analysis of Lenders' Influence on Agricultural Producers' Risk Management Decisions. *Southern Journal of Agricultural Economics*, *21*(2), 21–34.

Lee, W. F., Boehlje, M. D., Nelson, A. G., & Murray, W. G. (1988). *Agricultural Finance* (8th ed.). Iowa: Iowa State University Press.

Lefcourt, H. M., & Wine, J. (1969). Internal versus external control of reinforcement and the deployment of attention in experimental situations. *Canadian Journal of Behavioural Science*, *1*(3), 63–67.

Malhotra, N. (2008). Completion Time and Response Order Effects in Web Surveys. *Public*

Opinion Quarterly, *72*(5), 914–934.

McNairn, H. E., & Mitchell, B. (1992). Locus of Control and Farmer Orientation: Effects on

Conservation Adoption. *Journal of Agricultural and Environmental Ethics*, *5*(1), 87–101.

Mincer, J. (1974). *Schooling, Experience, and Earnings*. New York: Columbia University Press.

Minneapolis Grain Exchange. (2015). Hard Red Spring Wheat Futures Contract Specifications.

Retrieved June 7, 2015, from http://www.mgex.com/contract_specs.html

Minneapolis Grain Exchange. (2016a). Hard Red Spring Wheat Correlations. Retrieved January

1, 2016, from http://www.mgex.com/Correlations.html

Minneapolis Grain Exchange. (2016b). MGEX History. Retrieved June 6, 2016, from

http://www.mgex.com/history2.html

Mueller, S. L., & Thomas, A. S. (2000). Culture and Entrepreneurial Potential: A Nine Country

Study of Locus of Control and Innovativeness. *Journal of Business Venturing*, *16*, 51–75.

Musser, W. N., Patrick, G. F., & Eckman, D. T. (1996). Risk and Grain Marketing Behavior of

Large-Scale Farmers. *Review of Agricultural Economics*, *18*(1), 65–77.

Nederhof, A. J. (1985). Methods of coping with social desirability bias: a review. *European

Journal of Social Psychology*, *15*(3), 263–280.

Newbery, D., & Stiglitz, J. (1981). *The Theory of Commodity Price Stabilization* (1st ed.). New

York: Oxford University Press.

Nunnally, J. C. (1978). *Psychometric theory*. New York: McGraw-Hill.

Parliament of Canada. Bill C-24: Canadian Wheat Board Act (1985). Statutes of Canada: 1985, c. C-12, s. 1. Retrieved from http://lois-laws.justice.gc.ca/eng/acts/C-24/20070301/P1TT3xt3.html

Parliament of Canada. Bill C-18: Marketing Freedom for Grain Farmers Act (2011). Statutes of Canada: 2011, c. 25. Retrieved from http://www.parl.gc.ca/LegisInfo/BillDetails.aspx?Language=E&Mode=1&Bill=C18&Parl=41&Ses=1

Pennings, J. M. E., & Garcia, P. (2001). Measuring Producers ' Risk Preferences: A Global Risk-Attitude Construct. *American Journal of Agricultural Economics*, *83*(4), 993–1009.

Pennock, D., Bedard-Haughn, A., & Viaud, V. (2011). Chernozemic soils of Canada: Genesis, distribution, and classification. *Canadian Journal of Soil Science*, *91*(5), 719–747.

Powers, M. (1968). Hedging, Forward Contracting, and Agricultural Credit: A Study of Factors in Making Loans to Farmers and Firms. *Bulletin 545, Agricultural Experiment Station, South Dakota State University, Brookings*.

Psacharopoulos, G. (1994). Return to investment in education: A Global Update. *World Development*, *22*(9), 1325–1343.

Rogers, E. M. (1976). New Product Adoption and Diffusion. *Journal of Consumer Research*, *2*(4), 290–301.

Rotter, J. B. (1966). Generalized Expectancies for Internal versus External Control of Reinforcement. *Psychological Monographs: General and Applied*, *80*(1), 1–28.

Sartwelle, J., O'Brien, D., Tierney, W., & Eggers, T. (2000). The effect of personal and farm

characteristics upon grain marketing practices. *Journal of Agricultural and Applied*

Economics, *32*(1), 95–111.

Schroeder, T. C., Parcell, J. L., Kastens, T. L., & Dhuyvetter, K. C. (1998). Perceptions of

marketing strategies: Producers versus extension economists. *Journal of Agricultural and*

Resource Economics, *23*(1), 279–293.

Seeman, M. (1959). On the meaning of alienation. *American Sociological Review*, *24*, 782–791.

Shapiro, B. I., & Brorsen, B. W. (1988). Factors Affecting Farmers' Hedging Decisions. *North*

Central Journal of Agricultural Economics, *10*(2), 145–153.

Sia, A., Hungerford, H., & Tomera, A. (1985). Selected predictors of responsible environmental

behaviour: an analysis. *Journal of Environmental Education*, *17*, 31–40.

Singh, V. (2004). *Factors associated with household Internet use in Canada, 1998-2000*.

Statistics Canada. Retrieved from http://www.statcan.gc.ca/pub/21-601-m/21-601-

m2004066-eng.pdf

Smidts, A. (1997). The Relationship between Risk Attitude and Strength of Preference: A Test of

Intrinsic Risk Attitude. *Management Science*, *43*(3), 357–370.

Statistics Canada. (2011a). Census of Agriculture, farms classified by size of farm, Canada and

provinces. Retrieved January 23, 2015, from

http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=0040005&pattern=004

-0001..004-0017&tabMode=dataTable&srchLan=-1&p1=-1&p2=31

Statistics Canada. (2011b). Snapshot of Canadian Agriculture. Retrieved January 23, 2015, from

    http://www.statcan.gc.ca/pub/95-640-x/2012002/01-eng.htm

Statistics Canada. (2014a). Detailed average operating revenues and expenses of farms, by farm

    type, incorporated and unincorporated sectors, Canada and provinces, annual. Retrieved

    January 23, 2015, from http://www5.statcan.gc.ca/cansim/a26?lang=eng&id=20044

Statistics Canada. (2014b). Estimated areas, yield, production and average farm price of principal

    field crops, in metric units, annual. Retrieved January 23, 2015, from

    http://www5.statcan.gc.ca/cansim/a26?lang=eng&id=10010

Talamini, L. M., & Gorree, E. (2012). Aging memories : Differential decay of episodic memory

    components. *Learning & Memory*, *19*, 239–246.

Tobin, J. (1958). Estimation of Relationships for Limited Dependent Variables. *Econometrica*,

    26(1), 24–36.

Tomek, W. G. (1987). Effects of Futures and Options Trading on Farm Incomes. *Department of

    Agricultural Economics Staff Paper*, *87*(9).

Townsend, J. P., & Brorsen, B. W. (2000). Cost of Forward Contracting Hard Red Winter

    Wheat. *Journal of Agricultural and Applied Economics*, *32*(1), 89–94.

Tversky, A., & Kahneman, D. (1981). The Framing of Decisions and the Psychology of Choice.

    Science, *211*(4481), 453–458.

University of Saskatchewan Department of Soil Science. (2015). Soils of Canada. Retrieved

    January 1, 2015, from http://www.soilsofcanada.ca/

US Senate. Food, Conservation, and Energy Act of 2008 (2008). Retrieved from

 https://www.congress.gov/bill/110th-congress/house-bill/2419

van Blokland, P. (1974). Farm Credit, the Banker and the Use of Live Cattle Futures Contracts:

 An Illinois Case Study. *M.S. Thesis, University of Illinois, Urbana-Champaign.*

Veblen, T. (1899). *The theory of the leisure class* (Modern Lib). New York: MacMillan.

Vergara, O., Coble, K. H., Knight, T. O., Patrick, G. F., & Baquet, A. E. (2004). Cotton

 producers' choice of marketing techniques. *Agribusiness*, *20*(4), 465–479.

Von Neumann, J., & Morgenstern, O. (1944). *Theory of Games and Economic Behavior* (1st

 ed.). Princeton University Press.

Wang, H. H., Hanson, S. D., Myers, R. J., & Black, J. R. (1998). The Effects of Crop Yield

 Insurance Designs on Farmer Participation and Welfare. *American Journal of Agricultural*

 Economics, *80*(4), 806–820.

White, N. D. G., Demianyk, J., Sinha, R. N., Mills, J. T., Abramson, D., Muir, W. E., & Jayas,

 D. S. (1999). Multi-year monitoring for quality changes of grain stored in 550 tonne

 capacity grain bins in western Canada. In *Proceedings of the 7th international working*

 conference on stored-product protection (Vol. 2, pp. 1301–1313). Chengdu, PR China:

 Sichuan Publishing House of Science and Technology.

Willock, J., Deary, I. J., McGregor, M. M., Sutherland, A., Edwards-Jones, G., Morgan, O.,

 Dent, B., Grieve, R., Gibson, G., & Austin, E. (1999). Farmers' Attitudes, Objectives,

 Behaviors, and Personality Traits: The Edinburgh Study of Decision Making on Farms.

Journal of Vocational Behavior, *54*(1), 5–36.

Wolf, C. (2012). Dairy farmer use of price risk management tools. *Journal of Dairy Science*, *95*(7), 4176–83.

Appendix A: Survey Questions

SUBJECT LINE: Survey Invite from Ipsos Agriculture and Animal Health – University of Saskatchewan survey

==

On behalf of the University of Saskatchewan, we invite you to participate in a confidential survey that is being conducted as part of a Masters thesis at the University of Saskatchewan. The purpose of the survey is to better understand the general crop marketing practices of farmers in Western Canada, and to ask about potential changes in practices since the Marketing Freedom for Grain Farmers Act came into force on August 1st 2012.

Your farm was selected at random for this survey from our database of Western Canada farmers. If you qualify for this study (there will be a few short questions at the beginning of the survey to verify you qualify for this study) and agree to participate, **you will receive a cheque for $20 as a token of appreciation for your time and input.**

The results from this survey will be used for statistical purposes and published in aggregate form only. **Your identity and the information you provide will be kept confidential and anonymous.**

We ask that you complete the survey as soon as possible, but no later than (date), 2014. The person completing the survey should be one of the decision makers in your farm operation that is involved in marketing your grain and oilseeds crops.

To complete the online survey, please click on the URL below, or copy it into the address/ location bar of your internet browser. If you copy the link, please make sure to copy the entire link as it will sometimes wrap to the following line.

^SLINK^

In the event that you cannot complete the survey in one sitting, the data will be saved automatically. You will be able to return to the link and continue where you left off.

If you have any problems accessing the site or completing the survey, please email us at [INSERT HELP EMAIL ADDRESS].

While participation in this survey is voluntary, your participation is very important to us! Thanks again for your time and input. It is much appreciated.

Best regards,

Ipsos Agriculture and Animal Health

100 Stone Road West, Suite 303

Guelph, ON N1G 5L3

519-780-4702

---

*Ipsos is a member of the Marketing Research Intelligence Association which has a code of standards and ethics for survey research.

Privacy Policy | Sweepstakes Rules

This email was sent to: [ENTER RESPONDENT EMAIL]

If you require any help with this survey, please quote survey number: [ENTER SURVEY NUMBER]

[INTRODUCTION - PLACE ON LOG IN SCREEN]

Thank you for your interest in our web-based survey. If you qualify, the survey takes about 30 minutes and you will receive a cheque for $20.00 in appreciation for your time and input for completing the survey.

INSTRUCTIONS [SHOW AS FIRST SURVEY PAGE, SHOW HEADING]

Please answer each question by clicking inside the appropriate box or circle. Use the "next" button on your screen to advance to the next question. If you have any problems or technical questions, please e-mail [INSERT HELP EMAIL]. We will respond within 24 hours. Thank you again for your participation.

Please click on "next" button to start the survey.

<u>Qualifiers</u>

A. You are invited to participate in a study entitled: ***Attitude Toward and Use of Risk Management Tools in Agriculture***

133

Researcher: Eric Micheels, Ph.D. Assistant Professor, Department of Bioresource Policy, Business

and Economics, University of Saskatchewan, Saskatoon, SK

Phone: 306-966-8411; Email: eric.micheels@usask.ca

Purpose and procedure: I would like to receive your responses to some questions about your grain

marketing and risk management practices. The data collected through this survey will be used in a

Master's thesis in the Department of Bioresource Policy, Business and Economics at the University of

Saskatchewan.

This research project is coordinated by the Department of Bioresource Policy, Business and Economics at

the University of Saskatchewan. The results of this research will be used in partnership with the

department and the Saskatchewan Ministry of Agriculture.

Your participation in this study is appreciated and voluntary. It is expected that the survey should take

about 30 minutes to complete.

Potential Benefits: Your participation will help document the changes in grain marketing since 2012 and

the effects on the performance of farms in the Prairies. Your answers will provide insight for policy

makers and private industry.

Potential Risks: The there are no known risks to participating in this survey.

Storage of Data: The data from the survey will be securely stored by the Information Technology Division at the University of Saskatchewan. The data will be destroyed, after at least 5 years, when it is no longer required.

Confidentiality: Data will be combined and aggregated to protect individual respondents. The research conclusions will be published in a variety of formats, both print and electronic. These materials will be used in the development of a Master's Thesis and may be further used for purposes of conference presentations, or publication in academic journals, books or popular press. In these publications, the data will be reported in a manner that protects confidentiality and the anonymity of participants.

Right to Withdraw: Participation in this survey is voluntary, and you can decide not to participate at any time by closing your browser, or choose not to answer any questions you do not feel comfortable with. Survey responses will remain anonymous. Since the survey is anonymous, once it is submitted it cannot be removed.

You will be informed of any major changes that occur in the circumstances of this study or in the purpose and design of the research that may have a bearing on your decision to remain as a participant. You should also feel free to decline to answer any particular question(s).

Questions: If you have any questions concerning the research project, please feel free to contact the Researcher at the number provided above.

This research project has been approved on ethical grounds by the University of Saskatchewan Research Ethics Board. Any questions regarding your rights as a participant may be addressed to that committee through the Research Ethics Office ethics.office@usask.ca (306) 966-2975. Out of town participants may call toll free (888) 966-2975.

Consent to Participate: I have read and understood the description provided above. Completion of this survey will constitute consent to participate and permission for the researcher to use the data gathered in the manner described. If you would like a copy of this consent form for your record, please contact the Researcher: Dr. Eric Micheels, Phone: 306-966-8411 or Email: eric.micheels@usask.ca .

I Accept (== 1)

I Decline

[PROGRAMMER: ADD AN OPTION FOR "Refuse to answer" TO EVERY QUESTION AFTER QA SHOULD BE AN EXCLUSIVE RESPONSE]

B. Approximately how many acres of cereals (wheat, durum and/or barley) did you grow last year, 2013?

C. And approximately how many acres of canola did you grow last year, 2013?

[IF ACRES IN Q.B + Q.C = 1,000 OR MORE, CONTINUE, OTHERWISE THANK & TERMINATE]
[THANK & TERMINATE: I'm sorry, but we've talked to enough farmers with your size of farm operation. Thank you for your time.]

D. To confirm, are you the person that has overall or joint responsibility of marketing your wheat and canola?   *(Please select one response)*

Yes (== 1)

No

[IF YES, CONTINUE]

[IF NO OR REFUSE, THANK AND TERMINATE]

[THANK & TERMINATE: Thank you, but the study involves farmers that have overall or joint responsibility of marketing their wheat and canola. We hope that you will be able to participate in a survey on a different topic in the near future.]

[STUDY]

Thank you. We would like you to participate in our study.

1) First of all, please indicate how your usage of forward contracts and financial markets has changed since the changes to the Canadian Wheat Board, defined here as August 1st 2012.
   If you did not use forward contracts and (or) financial markets before August 1st 2012

   and have continued to not use them, please select the "Never Used" option.

	Decreased	No Change	Increased	Never Used
Wheat Forward Contracts	1	2	3	4
Canola Forward Contracts	1	2	3	4
Futures	1	2	3	4
Options	1	2	3	4

REFUSED == 5

[IF "NEVER USED" SELECTED FOR "WHEAT FORWARD CONTRACTS" AND

"CANOLA FORWARD CONTRACTS" IN Q.1 SKIP TO Q.4 OTHERWISE CONTINUE]

2) Have you ever used forward contracts with any of the following clauses? (*Please select all that apply.*)

Fixed basis and fixed price	1	Targeted price (aka Grain Pricing Order)	4	Averaged Price	7
Only fixed basis	2	Minimum price guarantee with potential increase	5	Includes Put or Call options	8
Only fixed price	3	Trailing stop on price	6	Act of God	9
None of the above [EXCLUSIVE RESPONSE]	10				

[IF "NEVER USED"" SELECTED FOR "WHEAT FORWARD CONTRACTS" IN Q.1 SKIP TO Q.4 OTHERWISE CONTINUE]

3) When forward contracting wheat, please indicate how important each of the following concerns were in determining how much of your wheat to contract. (1=not a concern, 7 very concerning) 8 = REFUSE

a. Grade

1	2	3	4	5	6	7
○	○	○	○	○	○	○

b. Protein Content

1	2	3	4	5	6	7
○	○	○	○	○	○	○

c. Yield

1	2	3	4	5	6	7
○	○	○	○	○	○	○

d. Rising Prices

1	2	3	4	5	6	7
○	○	○	○	○	○	○

e. Moisture content

1	2	3	4	5	6	7
○	○	○	○	○	○	○

f. Other (Please Specify)

1	2	3	4	5	6	7
○	○	○	○	○	○	○

[ASK ALL]

4) Please indicate how much you agree with the following statements about forward contracting. (1 = I completely disagree, 7 = I completely agree) 8 = REFUSE

    a. Forward contracted production gets a better price than other marketing methods.

1	2	3	4	5	6	7
○	○	○	○	○	○	○

    b. Delivery is assured for forward contracted production.

1	2	3	4	5	6	7
○	○	○	○	○	○	○

    c. Forward contracts provide more security through ensured sales.

1	2	3	4	5	6	7
○	○	○	○	○	○	○

    d. I rely on forward contracts to ensure steady income.

1	2	3	4	5	6	7
○	○	○	○	○	○	○

    e. I cannot enforce forward contracts.

1	2	3	4	5	6	7
○	○	○	○	○	○	○

    f. Forward contracts are just as likely to hurt me as help me.

1	2	3	4	5	6	7
○	○	○	○	○	○	○

[IF "FUTURES" AND "OPTIONS" IN Q.1 = "NEVER USED" SKIP TO Q.7 OTHERWISE CONTINUE]

5) Which of the following do you use to manage your futures and options trading? (Please select all that apply)

Self-directed management	1
Professionally managed through a bank affiliated brokerage	2
Professionally managed through a brokerage not bank affiliated	3
Other (Please Specify)	4

6) Have you ever had any of the following negative experiences with futures and options trading? (Please select all that apply)

Margin Call	1	Losses incurred from commissions	2
Inability to offset a hedged position	3	Other (Please Specify)	4

7) Which, if any, of the following markets do you follow? (Please select all that apply)

Chicago Board of Trade (CBOT)	1
Chicago Mercantile Exchange (CME)	2
Chicago Climate Exchange (CCX)	3
Flett Exchange	4
Hedge Street Exchange	5
Houston Street Exchange	6
Intercontinental Exchange (ICE)	7
Kansas City Board of Trade (KCBT)	8
Memphis Cotton Exchange	9
Minneapolis Grain Exchange (MGEX)	10
Nadex Exchange	11
New York Mercantile Exchange (NYMEX)	12
Other (Please Specify)	13
None [EXCLUSIVE]	14

8) Which commodities do you follow? (Please select all that apply)

Canadian Dollar	14
Canola	1
Cattle	2
Corn	3
Crude Oil - Brent	4
Crude Oil - WTI	5
Emissions	6
Gold	15
Hogs	7
Natural Gas	8
Soybeans	9
Soybean Meal	10
Soybean Oil	11
Rice	12
Wheat	13
Other (Please Specify)	16
Other (Please Specify)	17
None [EXCLUSIVE]	18

9) Which of the following sources, if any, do you gather marketing advice from? Please select all that apply.

Ag Web	1	Farm Link	7	Radio (Please Specify)	12
Agriculture.com	2	Grain News	8	Newsletter (Please Specify)	13
Canadian Wheat Board	3	Western Producer	9	TV Show (Please Specify)	14
Farm Journal	4	Elevator Agent	10	Friends and Neighbors	11
Farmlead.com	5	Other (Please Specify)	15	Other (Please Specify)	16
University Professors	6	None [EXCLUSIVE]	17		

10) Which of the following **2010** crops, if any, did you forward contract? Please do not include forward contracting of carryover stocks from previous years?

Wheat == 1

Canola == 2

Other (Specify) == 3

Other (Specify) == 4

Did not forward contract any **2010** crops == 5

Don't Know == 6

Refused == 7

[IF "DID NOT FORWARD CONTRACT ANY 2010 CROPS" OR DON'T KNOW OR

"REFUSED" IN Q.10 SKIP TO Q.11 OTHERWISE CONTINUE]

10.b For each of the following **2010** crops that you forward contracted – in the table below:

- Please indicate the total number of acres you grew in **2010**
- The total yield in bushels
- About how many bushels were forward contracted before seeding in **2010**
- And, about how many bushels were forward contracted while the crop was growing in the field in **2010**

2010 Forward contracted Crop	Total planted area (Acres) q10b(n)_1	Total yield (Bushels) q10b(n)_2	Average yield (Bushels/Acre)	Bushels forward contracted before seeding q10b(n)_3	Bushels forward while crop growing in the field q10b(n)_4
[INSERT CROP SELECTED IN Q.10]	[RANGE = 1 TO 99999]	[RANGE = 1 TO 9999999]	Auto fill (Total yield/ Total planted area)	[RANGE = 0 TO 9999999]	[RANGE = 0 TO 9999999]

146

[IF "FUTURES" AND "OPTIONS" IN Q.1 = "NEVER USED" SKIP TO Q.12 OTHERWISE CONTINUE]

11) For each of the following **2010** crops, please indicate if you made any trades in the futures or options markets.

FUTURES REFUSE == 4

OPTIONS REFUSE == 6

2010 Crop	Futures			Options				
	Buy	Sell	Did Not Buy or Sell Any Futures For This Crop	Buy Put	Buy Call	Sell Put	Sell Call	Did Not Buy or Sell Any Options For This Crop
Wheat	1	2	3	1	2	3	4	5
Canola	1	2	3	1	2	3	4	5
Other (Please Specify)	1	2	3	1	2	3	4	5

12) Which of the following **2011** crops, if any, did you forward contract? Please do not include forward contracting of carryover stocks from previous years?

Wheat == 1

Canola == 2

Other (Specify) == 3

Other (Specify) == 4

Did not forward contract any **2011** crops == 5

Don't Know == 6

Refused == 7

[IF "DID NOT FORWARD CONTRACT ANY 2011 CROPS" OR DON'T KNOW OR "REFUSED" IN Q.12 SKIP TO Q.13 OTHERWISE CONTINUE]

12.b For each of the following **2011** crops that you forward contracted – in the table below:

- Please indicate the total number of acres you grew in **2011**
- The total yield in bushels
- About how many bushels were forward contracted before seeding in **2011**
- And, about how many bushels were forward contracted while the crop was growing in the field in **2011**

2011 Forward contracted Crop	Total planted area (Acres)	Total yield (Bushels)	Average yield (Bushels/Acre)	Bushels forward contracted before seeding	Bushels forward contracted while crop growing in the field
[INSERT CROP SELECTED IN Q.12]	[RANGE = 1 TO 99999]	[RANGE = 1 TO 9999999]	Auto fill (Total yield/ Total planted area)	[RANGE = 0 TO 9999999]	[RANGE = 0 TO 9999999]

[PROGRAMMER: SUM OF RESPONSE FOR BUSHELS FORWARD CONTRACTED BEFORE SEEDING AND BUSHELS FORWARD CONTRACTED WHILE CROP GROWING MUST EQUAL GREATER THAN ZERO]

[IF "FUTURES" AND "OPTIONS" IN Q.1 = "NEVER USED" SKIP TO Q.14 OTHERWISE CONTINUE]

13) For each of the following **2011** crops, please indicate if you made any trades in the futures or options markets.

FUTURES REFUSE == 4

OPTIONS REFUSE == 6

2011 Crop	Futures			Options				
	Buy	Sell	Did Not Buy or Sell Any Futures For This Crop	Buy Put	Buy Call	Sell Put	Sell Call	Did Not Buy or Sell Any Options For This Crop
Wheat	1	2	3	1	2	3	4	5
Canola	1	2	3	1	2	3	4	5
Other (Please Specify)	1	2	3	1	2	3	4	5

14) Which of the following **2012** crops, if any, did you forward contract? Please do not include forward contracting of carryover stocks from previous years?

Wheat == 1

Canola == 2

Other (Specify) == 3

Other (Specify) == 4

Did not forward contract any **2012** crops == 5

Don't Know == 6

Refused == 7

[IF "DID NOT FORWARD CONTRACT ANY 2012 CROPS" OR DON'T KNOW OR

"REFUSED" IN Q.14 SKIP TO Q.15 OTHERWISE CONTINUE]

14b For each of the following **2012** crops that you forward contracted – in the table below:

- Please indicate the total number of acres you grew in **2012**
- The total yield in bushels
- About how many bushels were forward contracted before seeding in **2012**
- And, about how many bushels were forward contracted while the crop was growing in the field in **2012**

2012 Forward contracted Crop	Total planted area (Acres)	Total yield (Bushels)	Average yield (Bushels/Acre)	Bushels forward contracted before seeding	Bushels forward contracted while crop growing in the field
[INSERT CROP SELECTED IN Q.14]	[RANGE = 1 TO 99999]	[RANGE = 1 TO 9999999]	Auto fill (Total yield/ Total planted area)	[RANGE = 0 TO 9999999]	[RANGE = 0 TO 9999999]

[IF "FUTURES" AND "OPTIONS" IN Q.1 = "NEVER USED"" SKIP TO Q.16 OTHERWISE CONTINUE]

15) For each of the following **2012** crops, please indicate if you made any trades in the futures or options markets.

FUTURES REFUSE == 4

OPTIONS REFUSE == 6

2012 Crop	Futures			Options				
	Buy	Sell	Did Not Buy or Sell Any Futures For This Crop	Buy Put	Buy Call	Sell Put	Sell Call	Did Not Buy or Sell Any Options For This Crop
Wheat	1	2	3	1	2	3	4	5
Canola	1	2	3	1	2	3	4	5
Other (Please Specify)	1	2	3	1	2	3	4	5

16) Which of the following **2013** crops, if any, did you forward contract? Please do not include forward contracting of carryover stocks from previous years?

Wheat == 1

Canola == 2

Other (Specify) == 3

Other (Specify) == 4

Did not forward contract any **2013** crops == 5

Don't Know == 6

Refused == 7

[IF "DID NOT FORWARD CONTRACT ANY 2013 CROPS" OR DON'T KNOW OR

"REFUSED" IN Q.16 SKIP TO Q.17 OTHERWISE CONTINUE]

16b For each of the following **2013** crops that you forward contracted – in the table below:

- Please indicate the total number of acres you grew in **2013**
- The total yield in bushels
- About how many bushels were forward contracted before seeding in **2013**
- And, about how many bushels were forward contracted while the crop was growing in the field in **2013**

2013 Forward contracted Crop	Total planted area (Acres)	Total yield (Bushels)	Average yield (Bushels/Acre)	Bushels forward contracted before seeding	Bushels forward contracted while crop growing in the field
[INSERT CROP SELECTED IN Q.16]	[RANGE = 1 TO 99999]	[RANGE = 1 TO 9999999]	Auto fill (Total yield / Total planted area)	[RANGE = 0 TO 9999999]	[RANGE = 0 TO 9999999]

[IF "FUTURES" AND "OPTIONS" IN Q.1 = "NEVER USEDSKIP TO Q.18 OTHERWISE CONTINUE]

17) For each of the following **2013** crops, please indicate if you made any trades in the futures or options markets.

FUTURES REFUSE == 4

OPTIONS REFUSE == 6

2013 Crop	**Futures**			**Options**				
	Buy	Sell	Did Not Buy or Sell Any Futures For This Crop	Buy Put	Buy Call	Sell Put	Sell Call	Did Not Buy or Sell Any Options For This Crop
Wheat	1	2	3	1	2	3	4	5
Canola	1	2	3	1	2	3	4	5
Other (Please Specify)	1	2	3	1	2	3	4	5

18) How aware are you of your yearly cost of production? (1 = Total guess, 7 = Calculated to the penny)   REFUSE == 8

1	2	3	4	5	6	7
◯	◯	◯	◯	◯	◯	◯

19) Did you market any/all crops from the 2012 and 2013 crop years through any of the following? Please select all that apply. REFUSE == 8

Canadian Wheat Board   1

Cargill   2

Viterra   3

Richardson Pioneer   4

A marketing co-op (Please Specify)   5

Other (Please Specify)   6

Other (Please Specify)   7

20) Do you employ a marketing advisor? REFUSE == 3
    a. Yes ==1
    b. No ==2

21) Which insurance programs, if any, did you have in the following (2010-2013) crop years? Which do you plan to use this year (2014)? Select all that apply to any of your production. [PROGRAMMER: RESPONDENT MUST SELECT AT LEAST ONE RESPONSE FOR EACH COLUMN]

Year	2010	2011	2012	2013	2014
Multi-Peril	1	1	1	1	1
Organic	2	2	2	2	2
Forage	3	3	3	3	3
Weather Derivative	4	4	4	4	4
Hail	5	5	5	5	5
Agristability	6	6	6	6	6
Input Insurance (Please Specify)	7	7	7	7	7
Other (Please Specify)	8	8	8	8	8
None of the above [EXCLUSIVE]	9	9	9	9	9

22) To what degree do you feel the following statements represent your opinions? (1 = not representative, 7 = very representative) REFUSE == 8
[RANDOMIZE ORDER]

a. When selling my wheat, I prefer financial certainty to financial uncertainty.

1	2	3	4	5	6	7
○	○	○	○	○	○	○

b. When selling my canola, I prefer financial certainty to financial uncertainty.

1	2	3	4	5	6	7
○	○	○	○	○	○	○

c. I am willing to take higher financial risks in order to realize higher average returns.

1	2	3	4	5	6	7
○	○	○	○	○	○	○

d. I like taking financial risks.

1	2	3	4	5	6	7
○	○	○	○	○	○	○

e. When selling my wheat, I am willing to take higher financial risks in order to realize higher average returns.

1	2	3	4	5	6	7
○	○	○	○	○	○	○

f. When selling my canola, I am willing to take higher financial risks in order to realize higher average returns.

1	2	3	4	5	6	7
○	○	○	○	○	○	○

g. I like "playing it safe".

1	2	3	4	5	6	7
○	○	○	○	○	○	○

h. With respect to the conduct of business, I am risk averse.

1	2	3	4	5	6	7
○	○	○	○	○	○	○

i. With respect to the conduct of business, I prefer certainty to uncertainty.

1	2	3	4	5	6	7
○	○	○	○	○	○	○

23) Please indicate your agreement with the following statements. (1 = do not agree, 7 = completely agree) REFUSE == 8
[RANDOMIZE ORDER]

a. My success in marketing depends on whether I am lucky enough to deliver to the right place at the right time.

1	2	3	4	5	6	7
○	○	○	○	○	○	○

b. To a great extent my income is controlled by accidental happenings.

1	2	3	4	5	6	7
○	○	○	○	○	○	○

c. When I get the price I want, it is usually because I am lucky.

1	2	3	4	5	6	7
○	○	○	○	○	○	○

d. Farm income is determined by my own actions.

1	2	3	4	5	6	7
○	○	○	○	○	○	○

e. When I get the price I want, it is usually because I worked hard for it.

1	2	3	4	5	6	7
○	○	○	○	○	○	○

f. It is not wise for me to plan too far ahead, because markets turn out to be a matter of bad fortune.

1	2	3	4	5	6	7
○	○	○	○	○	○	○

g. Whether or not I am successful in marketing depends mostly on my ability.

1	2	3	4	5	6	7
○	○	○	○	○	○	○

h. I feel that the price I receive is mostly determined by people in powerful positions.

1	2	3	4	5	6	7
○	○	○	○	○	○	○

i. I feel in control of my marketing.

1	2	3	4	5	6	7
○	○	○	○	○	○	○

j. Success in business is mostly a matter of luck.

1	2	3	4	5	6	7
○	○	○	○	○	○	○

24) a) What was the total number of crop acres you grew in 2013?

[RANGE = 1,000 TO 999999]

 [IF REFUSED SELECTED IN Q24A SKIP TO Q25, OTHERWISE CONTINUE]

24.b Of the [INSERT RESPONSE FROM Q24A] crop acres you grew in 2013, how many of

these acres did you i) own, ii) rent?

Acres Owned

    [RANGE= 0 TO RESPONSE IN Q.24.a]

Acres Rented

    [RANGE= 0 TO RESPONSE IN Q.24.a]

[PROGRAMMER: SUM OF ACRES OWNED AND ACRES RENTED MUST EQUAL

RESPONSE TO Q24A]

25) Please select the range for your 2013 gross farm sales. (K = thousands of Canadian dollars)

Less than $100K	$100K to $249K	$250K to $499K	$500K to $749K	$750K to $1,000K	$1,000K to $1,500K	Greater than $1,500K	Don't Know	Refuse to Answer
1	2	3	4	5	6	7	8	9

26) Currently, what is your debt to asset ratio? $(\frac{Total\ Debt}{Total\ Assets})*100$

0%	1% to 9%	10% to 24%	25% to 50%	Greater than 50%	Don't Know	Refuse to Answer
1	2	3	4	5	6	7

26.a And which of the following categories best fits your net farm income for 2013? That is, your gross farm receipts plus any government payments minus your farm expenses, not including depreciation.

Less than $0   ==1

Between $0 and $10,000   ==2

From $10,000 to less than $25,000   ==3

From $25,000 to less than $50,000   ==4

From $50,000 to less than $100,000   ==5

From $100,000 to less than $150,000   ==6

From $150,000 to less than $200,000   ==7

From $200,000 and less than $250,000   ==8

From $250,000 to less than $500,000   ==9

$500,000 or more   ==10

REFUSE   ==11

27) What is the ownership structure of your farm? Please select one response.
   a. Sole proprietorship   == 1
   b. Partnership   == 2
   c. Incorporation   == 3
   d. Farm incorporation   == 4
   e. Publicly traded company   == 5
   f. Other (Please Specify)   == 6

28) .a In bushels, in total, how much permanent and temporary grain and oilseed storage do you currently own?

[RANGE = 0 TO 999999999]

[IF REFUSED SELECTED IN Q28A SKIP TO Q29, OTHERWISE CONTINUE]

28.b Of the [INSERT RESPONSE FROM Q28A] bushels of total grain and oilseed storage you

own, in bushels, about how much is i) permanent storage, ii) temporary storage?

i) Permanent storage (bushels)

[RANGE = 0 TO RESPONSE FROM Q.28.a]

ii) Temporary storage (bushels)

[RANGE = 0 TO RESPONSE FROM Q.28.a]

[PROGRAMMER: ADD TOTAL ROW THAT AUTOSUMS Q.28.b – TOTAL MUST SUM

TO RESPONSE FROM Q28A]

29) Have you increased your grain or oilseed storage since 2010?
   a. Yes == 1
   b. No == 2

30) Are you able to clean your grain or oilseed on farm?
   a. Yes == 1
   b. No == 2

31) Are you able to dry your grain or oilseed on farm?
   a. Yes == 1
   b. No == 2

32) Are you mainly a grain or oilseed farm, mainly a mixed farm (about 50:50 grain or oilseed and livestock), or, mainly a livestock operation?
   a. Mainly grain or oilseed farm == 1
   b. Mainly a mixed farm   == 2
   c. Mainly livestock farm   == 3
   d. Other (specify)   == 4

   [IF MAINLY A MIXED FARM OR LIVESTOCK FARM IN Q.32 CONTINUE,

   OTHERWISE SKIP TO Q.34]

33) Do you use your own grain crop as feed for your livestock? Please indicate grain use only. Do not include using straw, hay or alfalfa as feed.
   a. Yes   == 1
   b. No   == 2

34) In an average year, about how many points (elevators, mills, etc.) do you deliver wheat to?

   [RANGE = 0 TO 99]

35) In an average year, about how many points (elevators, crushers, etc.) do you deliver canola to?

[RANGE = 0 TO 99]

36) Including yourself and family members, about how many people work **full time** on the farm? (Full time is defined here as working a minimum 40 hours per week from April until November.)

[RANGE = 0 TO 999]

37) Including yourself and family members, about how many people work **part time** on the farm? (Part time is defined here as working less than 40 hours a week, or being "on call" and receiving no pay while there is no work, from April until November.)

[RANGE = 0 TO 999]

38) Approximately how many years have you been the primary manager of your farm? (Round up to the nearest full year.)

[RANGE = 0 TO 99]

39) On average, about how many hours per year do you spend attending marketing workshops? Include online workshops in your total.

   [RANGE = 0 TO 9999]

40) On average, about how many workshops do you pay to attend per year?

   [RANGE = 0 TO 99]

41) a Did any of your pre-harvest marketing or hedging in 2013 increase your income?

Yes   == 1

No   == 2

Don't know   == 3

Did not pre-harvest market or hedge any of my crops in 2013 == 4

[IF YES IN Q.41.a – CONTINUE, OTHERWISE SKIP TO Q.42]

41.b If so, by approximately what percentage did your pre-harvest marketing or hedging in 2013

increase your income? REFUSE == 9998

[RANGE = 0 TO 100]

Don't' know.

42) How do you rate yourself as a manager of risks? (1 = very poor, 7 = very good)

1	2	3	4	5	6	7
○	○	○	○	○	○	○

43) What year were you born?

NUMERIC FIELD [RANGE: 1900 TO 1996]
Decline to respond

44) What is the highest level of formal education you've achieved?
    a. High school certificate or equivalent   ==1
    b. Apprenticeship or trades certificate or diploma   == 2
    c. Community college, CEGEP or other non-university certificate or diploma == 3
    d. University degree, for example, a bachelor degree   == 4
    e. Post-graduate degree, for example, Master's, PhD, lawyer, doctor   == 5
    f. Or, No certificate, diploma, or degree   == 6
   Refuse == 7

45) Please type in the name of the RM(s) you farm in. REFUSE == 1

46) Which soil zone(s) do you farm in?

       Brown   == 1

       Dark Brown == 2

       Black   == 3

       Dark Grey   == 4

       Grey   == 5

       Unsure   == 6

CLOSING:

47) That completes our survey. Thank you very much for your time and participation in our survey. Your input is greatly appreciated. As promised, as a token of appreciation for your time and input, we will send you a cheque for $20. You can expect to receive your cheque in about 4 to 6 weeks. Please confirm your name and address information below so we can send you your cheque:

       [PROGRAMMER: DISPLAY EACH ITEM FROM SAMPLE]

       First Name

       Last Name

       Address

       Town

Province

Postal code

[RESPONSE LIST]

All information is correct

I need to change some information

[IF "I NEED TO CHANGE SOME INFORMATION, CONTINUE, OTHERWISE SKIP TO END]

48) Please enter the correct name and address information below so we can send you your cheque:

[PROGRAMMER: RECORD EACH ITEM]

First Name

Last Name

Address

Town

Province

Zip code

[SCRIPT MAKE ENTRY OF EACH FIELD MANDITORY TO PROCEED]

[END]

Thank you very much for your time and input!