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An analysis of the use of farm marketing and crop insurance risk transfer tools by Iowa farm characteristics

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by

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CHAPTER I. BUSINESS RISK IN AGRICULTURE

Farming is susceptible to various kinds of risk. Within this risky environment, each farmer possesses a set of risk management options and tools that may be used to alter or transfer risks. The goal of this study is to determine if there are significant relationships among the use of such business risk transfer tools and farm characteristics, such as age of the operator, farm size, financial risk and performance, and farm policy preferences.

Risk Factors in the Farm Environment

Risk is usually defined as the variability of income or the probability that an event would have an adverse effect on income. Weather and the environment represent a set of risks that are beyond the control of farmers. These risk factors integrate with the unique production resources and practices of each farmer to generate a perceived set of business production risks.

Commodity supply and demand conditions, market institutions, and farm programs represent another set of risk factors beyond the control of individual farmers. These factors combine and integrate with the unique marketing resources and practices of each farmer to generate a perceived set of business marketing risks.

Interest rates, inflation, and changes in asset values are another set of factors that are generally beyond the control of

individual farmers. These factors combine with the unique financial resources and debt practices of each farmer to generate a set of financial risks.

Business and financial risks interact in such a way to generate a unique set of total risks faced by each firm.

Risk Transfer Tools and Strategies

For each kind of risk, there is a set of risk management alternatives. Such alternatives include traditional risk management strategies, for example, trade-offs between diversification and specialization, livestock breeding and feeding practices, excess machinery capacity, timeliness in planting and harvesting, and participation in government farm programs. A number of other risk transfer tools are now available, including a variety of forward contracting arrangements and commodity options in addition to hedging on the futures market. Farmer use of these marketing risk transfer tools has increased as farm prices have become more variable since the 1960s.

In addition, the federal government has attempted in recent years to shift away from providing emergency disaster relief for drought affected farmers by providing subsidized multiple peril crop insurance for farmers. While many private insurers have historically written hail and fire crop insurance, multiple peril crop insurance offers much broader coverage of production risks.

Other policies and studies have acknowledged the interrelationships of the various risks and risk management tools available. For example, producers who borrow from the Farmers Home Administration (FmHA) are required to purchase crop insurance. FmHA is the lender of last resort. This policy expresses an apparent social value in which society believes that producers with large financial risks ought to reduce business risks by purchasing crop insurance. Schmiesing (1989) argues that combining crop insurance with forward contracting or options reduces the risk of incurring large penalties on the marketing tools in the event of a short crop.

Problem Statement

Various studies use linear programming, quadratic programming, or simulation to analyze the optimal risk management options for producers. This study attempts to analyze who uses these tools and if there are any statistically significant relationships among various risk management tools and farm characteristics. This information may provide important implications to policy makers, agribusinesses, and producers.

As government moves toward market-oriented policy, commodity price risks may likely increase for producers. Producers would be forced to adopt risk transfer strategies or bear the increases in risk on their own. Government officials may want to know who would most likely use the private risk

transfer tools, if we continue to move to market oriented policy. Government officials are also concerned about who uses crop insurance given the ever present possibility of drought and dry conditions prevalent throughout much of the United States during 1988 and 1989.

Agribusinesses are interested in designing products that farmers want. Therefore, agribusinesses are likely to be interested in knowing which risk transfer products are used by farmers and which farmers are most likely interested in utilizing and purchasing the various risk management tools.

Farmers are interested in what other farmers are doing for competitive purposes. Since many of the risk transfer tools have only been available for a few years, many farmers are interested in how the tools are being used and who is using such tools.

Thesis Objectives

The following three objectives are the guides used for conducting this research effort. The thesis objectives are:

1. To collect primary data and develop a descriptive analysis of the use of selected risk management tools by Iowa farmers.

2. Test for significant relationships between the use of marketing risk transfer tools and farm characteristics.

3. Test for significant relationships between the use of crop insurance and farm characteristics.

Organization of the Thesis

Chapter II provides a review of literature and develops the conceptual framework from which hypothesized relationships are developed. Chapter III reviews the data collection procedures and methodology used, and presents the hypothesized relationships. Chapter IV provides an analysis of results. Chapter V draws the thesis conclusions, implications, and suggestions for further research.

CHAPTER II. LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

Decision Making Under Uncertainty

Theory

Empirical specification of economic theory often assumes perfect knowledge of input/output relationships and future events. Rarely, however, does a farm manager know with certainty the final outcome of a decision at the time of the decision. Although farm managers face a less than certain environment, they can form expectations about possible outcomes. A classic economic assumption is that farmers attempt to maximize the present value of the expected profits from their operations.

Various attempts have been made to incorporate measures of risk and risk preference concepts into the classical model of the firm. In the early 1700s, Bernoulli was one of the first to theorize that individuals do not always allocate resources on the basis of maximized expected gain. He proposed an alternative expected utility hypotheses that included expected value and risk preferences (Bussey, 1978).

In accordance with this concept, decision-makers attach preferences to the potential occurrence of future events. These preferences and probabilities are unique to each farmer. Each farmer has different experiences and analytical ability to perceive disequilibrium, trends, and chance events and to diagnose corrective action. Risk preferences represent farmer attitudes toward diverting potential income to reduce the

variation in income or probability of a large negative income deviation expected by the firm. Therefore, the addition of risk preferences to the firm's objective function creates a problem of weighting multiple objectives to reflect the trade-offs between expected income and income variation or negative deviation.

Knight (1921) divided decision making into two situations in a world with less than perfect knowledge, risk and uncertainty. He used the term "risk" to refer to situations where the decision-maker knows all alternative outcomes and the objective probabilities associated with each outcome. "Uncertainty" referred to situations where the decision-maker does not know either all alternative outcomes or the objective probabilities associated with each.

Heady (1952) distinguished between decisions involving risk and those involving uncertainty, based on knowledge of the uncertain event's underlying probability distribution. He used the term "risk" to refer to the variability of outcomes which could be measured objectively based on either (1) a priori knowledge of the underlying probability distribution or (2) a sample of sufficient size to establish the statistical probability of the uncertain event. "Uncertainty" referred to outcomes with probability distributions that cannot be measured empirically, so that any estimate of probability would be entirely subjective.

Modern decision theory is based on the subjective probability formulated by the decision maker. The term "subjective" refers to probability measures elicited from the decision maker, while the term "objective" refers to probability measures computed from historical observations (Sonka and Patrick, 1984). Since even objective probabilities involve the subjective use by the decision-maker, the distinction between "risk" and "uncertainty" is unimportant, an the terms are often used interchangeably.

Portfolio theory can help explain how farm managers make decisions involving risk. It is often assumed that investors make decisions based solely on the expected return of a portfolio of securities, and on the risk, or variability associated with that portfolio (Franks, Broyles, and Carleton, 1985). Likewise, it is often assumed that farmers decide what bundle of commodities to produce based on the expected return of the commodities produced and on the variability of that return. Given equal expected returns for alternative production possibilities, risk averse managers are assumed to prefer the alternative with less variability. Alternatively, farm managers who are risk neutral are presumed to maximize the present value of expected profit regardless of risk.

Empirical studies

Empirical assumptions of risk preferences are incorporated into economic models using a variety of approaches. Some analysts use the subjective probability hypothesis by

suggesting that farmers base production and investment decisions upon how the risk environment influences personal or farm goals (Young, 1979).

Patrick uses this approach. He asked farmers to select a set of farm firm goal assumptions, with risk preferences implicitly included in the goals, to simulate the impacts of firm goals on capital structure and farm growth. An iterative budgeting model with stochastic yields and prices is used to simulate outcomes over a period of years (Patrick, 1979). This approach relies primarily upon indirect elicitation of risk preferences by analyzing farm goals as articulated by a sample of individual farm decision-makers (Patrick, Whittaker, and Blake, 1980; Dillion and Scandizzo, 1978).

The objective probability hypothesis is used by others by analyzing the observed behavior of farm firm decisions regarding the use of risk management strategies. For example, one study found that approximately two-thirds of a sample of Indiana farm operators exhibited a risk neutral attitude when developing annual crop mix plans (Brink and McCarl, 1978). The remaining individuals exhibited a risk avoidance behavior. Such empirical estimates of observed risk preferences in crop mix decisions have been incorporated into a stochastic linear programming models with a risk adjusted expected return objective function (Edelman, 1981).

A number of studies have used portfolio theory and quadratic programming to analyze risk behavior in the context

of farm planning and farm financial management (Collins and Barry, 1986; Sanint and Barry, 1983; Barry, Baker, and Sanint, 1981; Robinson and Brake, 1979).

Another approach is to incorporate a disaster definition of risk preferences that would involve subjective and objective probability criteria. Moscardi employs a safety first rule for defining disaster survival with a subsistence level of risk free income (Moscardi and de Janvry, 1977).

Richardson and Nixon (1986) use a variation of this approach to develop a model containing a set of criteria regarding firm level effects of various policy alternatives, the "Firm Level Income Tax and Farm Policy Simulator." A final approach to incorporating risk preferences is to use Monte Carlo simulations (Leatham, McCarl, and Richardson, 1987; Falatoonzadeh, Conner, and Pope, 1985) to develop probability distributions of outcomes.

In review of the risk behavior literature as applied to agriculture, much of it does not capture the interrelationships among the factors considered by farmers in making risk management decisions. The the focus of this thesis is on who actually uses the various business risk management tools and what factors influence these risk management decisions.

Measurement and Definition of Farm Risks

Relationship between business and financial risk

Business and financial risks are two types of risk faced by the farm firm. Business risk is the risk inherent with a

particular farm firm independent of how it is financed (Gabriel and Baker, 1980). By definition, business risk is the risk associated with a farm firm that is 100 percent equity financed. Business risk is generally reflected in the variability of net income or net cash flows (Gabriel and Baker, 1980). A high (low) coefficient of variation would indicate high (low) risk. The many sources of business risk in agriculture may be commonly classified as:

1. Production or technical risk: Risk due to the random variability inherent with the production process, including yield variability.

2. Marketing or price risk: Risk due to variation in prices of either farm output or production inputs.

3. Technological risk: Risk that current decisions may be offset by future improvements in technology.

4. Legal and social risk: Risk due to changes in the legal and social setting the firm operates in.

5. Human sources of risk: Risk due to the human factors of production, labor and management.

Financial risk, on the other hand, is associated with debt service requirements of the firm and is reflected in the added variability of net income due to the use of debt and interest rate variability. Financial risk includes both solvency and liquidity risk. Solvency risk refers to the probability that assets will pay all debt obligations if the farm were to be sold. It measures the risk of business failure due to the use

of debt financing.

Liquidity risk refers to the probability that assets will generate enough cash to pay current obligations. It measures the risk of failure to make accounts payable, principal and/or interest payments on time.

The principle of increasing risk describes the interaction between business and financial risk (Lee, Boehlje, Nelson, and Murray, 1980). More risk, or variability, is associated with increased use of leverage or debt capital, due to the need to make fixed interest payments. As the amount of debt used relative to equity increases, total risk becomes greater at an increasing rate. Increased leverage will increase income as long as the marginal rate of return of capital exceeds the the marginal cost of debt capital. However, the variability of that income stream will increase, as well, as leverage increases.

Gabriel and Baker (1980) researched the relationship between business and financial risk. They studied the level of financial risk accepted, given the level of inherent business risk. They hypothesized that a decline in business risk would lead to the acceptance of greater financial risk. This would reduce the effects of business risk on total risk. They found this to be true in aggregate. However, they found that different categories of farms might have different responses, depending on the particular risk preferences of the farm manager and other characteristics such as farm size or type.

Different business risk strategies may be adopted by farmers depending on the level of financial risk experienced, as measured by solvency or liquidity ratios. One might expect that those farms with greater solvency risk might be more likely to use tools to minimize the risk of price or income decreases in order to satisfy creditors. Alternatively, farmers with adequate liquidity ratios might be willing to accept greater business risks with the hope of potentially higher returns.

Measurement of financial performance

Financial statements are commonly used to measure business and financial risks. Risk is reflected in the variability of net operating income or net cash flows relative to the resources available. The balance sheet measures the assets, debts, and net worth of the farm operation at a point in time. The income statement measures net income over a period of time.

Financial ratios formulated from the balance sheet and income statement can be used to measure financial risk and performance. Early analyses of the 1980s farm debt situation were based on the farm debt-to-asset ratio (Jolly, 1984; Melichar, 1984). The debt-to-asset (DA) ratio has traditionally been used by farmers and lenders to measure solvency, or long-term borrowing capacity. The DA ratio is the ratio of total debts divided by total assets, multiplied by 100. It expresses in percentage terms the total amount of the farm operation financed by creditors.

A common standard is that farm operations with DA ratios greater than 40 percent are considered to be financially stressed, or subject to difficulties in meeting the fixed financial obligations of principal and interest. However, some farmers experience financial difficulties with lower ratios and some farm enterprises with superior management may never experience serious financial stress with much higher ratios.

Lines and Zulauf (1985) used logistic regression to test for significant relationships between the DA ratio and selected socioeconomic characteristics for a sample of Ohio farmers. They found significant positive relationships between DA ratio and operator age and farm size, and a significant negative relationship between DA ratio and percent of land that was owned.

Profitability is measured by the return on assets (ROA) and return on equity (ROE) ratios. The ROA is equal to net farm income plus interest expense all divided by the total asset value, multiplied by 100. This definition is traditionally used by agricultural economists but differs from the business school definition, where return on investment is calculated using income after interest expense. The ROA is net income (before interest payments) per dollar of assets, expressed as a percentage. The ROA represents the whole farm profit margin of a 100 percent equity financed firm and indicates farm management performance, given environmental factors, independent of the financing decision. A common

standard is that good and superior farm operations normally have an ROA of at least eight percent (Edelman and Olsen, 1988).

The ROE is net farm income divided by the equity value, multiplied by 100. The ROE is net income per dollar of equity and represents the return to the equity investment, expressed as a percentage. The ROA will equal the ROE for firms that are 100 percent equity financed. Increased use of debt capital will increase profitability if the ROE is greater than the interest rate on the borrowed funds. This measure is subject to variation in the interest rate expected on borrowed capital. A common ROE standard is that good and superior operations normally have an ROE of at least six percent (Edelman and Olsen, 1988).

Other financial ratio measures include: (1) debt to cash flow, which measures ability to service debt, (2) the current ratio, which measures liquidity or ability to meet current obligations and (3) the earned net worth ratio, which measures change in equity due to earnings.

Barickman (1985) used a classification system to measure financial stress based on the ROA relative to the ROE. She used logistic regression techniques to test for significant relationships between the four classes and several farm operation characteristics. A stronger relationship was found between the financial performance classification and other financial variables than between financial performance

classification and demographic variables.

Jolly et al. (1985) utilized a return on equity ratio based on cash flow rather than accrual income to measure financial stress. Jolly's cash flow included the cash income from off-farm income and did not include cash flow from the sale of machinery or real estate. This cash flow represents cash available to replace machinery or equipment, purchase real estate, or pay income tax.

Jolly and Olsen (1986) used a measure of financial stress based on a combination of liquidity and solvency measures. A classification system was developed using a cash flow to equity ratio, which is identicle to the liquidity measure used by Jolly et al. (1985) and the DA ratio, a measure of solvency. Based on this classification system, farms were placed into one of four groups classified as financially strong, stable, restructurable, and severely stressed. This same classification system was used in subsequent analyses on national farm financial data by Doye, Jolly, and Choat (1987) and on Iowa farm financial data by Edelman and Olsen (1987, 1988).

Melichar proposed a multivariate measure of financial stress based on the DA ratio, level of equity, the ROA, and ROE (cited in Lins et al. 1987). The ROA and ROE suggested by Melichar were based on cash flow rather than accrual income. This tends to support the approach used by Jolly and Olsen (1986) on Iowa farm financial data.

Lins et al. (1987) summarized several of the measures used to measure financial stress and their strengths and weaknesses. Lins pointed out that the DA ratio reveals little about income generating potential. He noted that a high DA ratio may signal poor income in some cases but the profitable use of leverage in other cases. He also noted that most of the income measures of financial stress were based on cash flow rather than accrual income. Cash flow may not accurately reveal whether the farm is experiencing financial stress since some farmers may have high cash flow return ratios only due to forced liquidations of crop and livestock inventories. Also, some operations may not have high cash return ratios as income may be delayed until the next accounting period. He does acknowledge, however, that many studies are limited to using cash return ratios since the data needed to figure accrual income is not easily obtained.

Penson (1987) emphasized the need to use several financial indicators to monitor farm financial trends. In addition to the DA, ROA, and ROE ratios, he suggests using a times interest earned ratio, a financial leverage index, and a debt burden ratio. The times interest earned ratio is calculated as the earnings before interest and taxes divided by the total interest payments, and measures the farm's ability to pay interest out of operating profit.

The financial leverage index is the firm's ROE divided by its ROA. It is similar to the measure used by Barickman (1985)

to measure financial stress. This ratio indicates whether the farm operation would benefit from increased or decreased leverage.

Finally, the debt burden ratio was calculated as the net cash farm income divided by total farm debt outstanding. It indicates the ability to retire debt obligations from income. Penson concluded that the three additional ratios outlined (times interest earned, financial leverage index, and debt burden) signaled the buildup of farm financial stress experienced in the 1980s long before the more commonly used DA, ROA, and ROE ratios.

The literature suggests a variety of approaches for measuring financial performance and risk. While financial risk is commonly measured by the variability of income over time, several financial ratios can measure the financial health of a particular industry or firm at a point in time and help predict future trends in financial performance. Tracking several measures of profitability, solvency, and liquidity can be more insightful than the use of any one measure alone. However, much of the literature appears to be based on conventional wisdom and professional experience rather than on empirical tests of significance. Exceptions include the studies by Lines and Zulauf (1985) and Barickman (1985).

Tools for Transferring Farm Business Risk

There are several tools and strategies for transferring the various types of business risk. For example, in production risk, risk management strategies include enterprise diversification, the selection of stable enterprises, and the use of crop insurance. Methods to reduce marketing risk include the spreading of sales throughout the year, hedging on the futures market, forward contracting for inputs or outputs, and using agricultural commodity options. In addition, many producers join farm organizations and commodity groups as a means of influencing farm programs to moderate business risks. For this analysis, selected risk management tools for reducing marketing and production risk are examined. The selected tools include forward contracting, commodity futures hedging, agricultural commodity options, and crop insurance.

Uses of forward pricing tools

Forward contracts, futures hedges, and agricultural commodity options are three tools that allow the farm manager to establish a price or price floor for a particular commodity before that commodity is actually sold or purchased.

Forward contracts are contracts between a particular seller and a particular buyer for a specified amount, to be delivered by a specified time, for a price specified in the contract. Three different types of forward contracts are normally available to Iowa producers. The most common type used is the forward cash contract which specifies a fixed price

and quantity, subject to discounts for moisture and quality factors (Futrell, 1987).

Another type of forward contract is a minimum price contract. This contract specifies an amount to be sold at a future date at a price level that cannot be below some specified amount. A third type of forward contract is a price later contract. This contract specifies an amount to be sold at a later date but allows the farmer to specify the price at a later date.

Forward contracts are arrangements typically made between farmers and their local elevators or farmers and their livestock packers. In most cases, the elevator or packer will in turn take an offsetting position in the futures market or forward contract itself in order to lock in a margin. While forward contracts are useful in establishing a price for farm produce, not all risk is eliminated. If a greater amount is forward contracted than is actually produced due to a short crop, the farmer must then purchase the commodity at the prevailing prices and possibly pay a significant penalty in order to meet the contract terms. The amount of this loss will depend on how short the crop is of meeting the terms and what the price of the commodity is at the time of execution of the contract.

In contrast to forward contracts, futures contracts and agricultural commodity option contracts are traded among many buyers and sellers on commodity exchanges. Commodity exchanges

are highly regulated and operate within specific rules of trade.

Commodity futures contracts are contracts to deliver a specified amount of a given commodity at a future time and to a specific place. By using the futures markets, it is possible to price a commodity as much as a year in advance. By selling a contract in the futures market equal to what will be sold at that future date, it is possible to "hedge" or lock in a minimum selling price for the commodity, assuming no change in local basis. Basis is the difference between the local cash price and the futures price. Since cash and futures prices tend to move in the same direction, losses in futures hedging tend to be offset by the increasing value of the actual product. Likewise, any loss in the cash value of the commodity tends to be offset by a gain in the futures hedge. In contrast to forward cash contracts, however, not all price risk is eliminated through the use of futures contracts because of basis risk, or possible adverse changes in the basis.

A distinction is drawn between two groups of traders--the speculators and the hedgers. Speculators try to anticipate price movements and buy or sell commodities in an attempt to earn the highest return. Hedgers have a different purpose for buying and selling futures contracts. Hedgers are involved in owning or producing the commodity that they trade on the futures market. Hedgers use futures markets to avoid risks of unfavorable price changes on the cash market (Futrell, 1987).

Agricultural commodity options are contracts that allow one to buy or sell a futures contract at a certain price, called the strike price, until a specific expiration date. Options are useful to minimize two risks that keeps many farmers from forward pricing (1) production risk, or the risk of forward contracting more than is produced and (2) the risk that prices will rise after selling the crop (Futrell, 1987). Any loss associated with purchasing commodity options is limited to the amount paid for the option, called the premium. Because of this feature, an advantage of options over futures contracts is that margin calls are not required. In addition, an advantage of options over forward contracting is that significant penalties from the use of forward contracts due to drought or other natural disasters are avoided.

A few applied studies have examined the actual use of forward contracting, futures hedges and options. Schmiesing et al. (1986) examined lender attitudes and practices toward various marketing alternatives in South Dakota. Surveys were sent to agricultural loan officers at all the commercial banks, Farm Credit System offices, and Farmers Home Administration county offices in the state. Survey results indicated that a significant proportion of lenders were not providing credit for margin accounts to allow producers to hedge, and about half sometimes placed limitations on the amount of credit provided after a hedged position was established. The research indicated that attention must be directed towards increasing

the knowledge of marketing alternatives by lenders to help reduce unnecessary lender restrictions on producer marketing strategies.

Use of crop insurance

Crop insurance is available in two forms, multiple peril and limited peril, including hail/fire insurance. Hail/fire insurance is available under two types of plans, spot and area (Edwards and Vogt, 1988). Spot coverage pays for losses based on the percentage loss on the damaged acres only--normal yields on non-damaged fields do not reduce payments. Area plans pay based on the percentage yield loss averaged across the entire insured unit. Hail/fire insurance is offered by private insurers, and may be purchased on only part of the farm and up to only a few weeks before harvest (Calkins and DiPietre, 1983).

Multiple peril crop insurance is subsidized by the federal government and covers a much broader range of production risks. Multiple peril insurance guarantees a minimum average yield per acre for the insured crop with the minimum determined by the level of coverage chosen--50 percent, 65 percent, or 75 percent of the long term average yield (Edwards and Vogt, 1988). Multiple peril crop insurance on most crops covers losses due to drought, excessive moisture, hail, wind and frost/freeze. The farmer has the option to purchase multiple peril crop insurance without hail/fire coverage, but must then purchase an equivalent dollar amount of hail/fire coverage

through other sources. Multiple peril crop insurance must be purchased by the date specified as the end of the sales period,which is September 30 for winter crops and March 30 for summer crops in Iowa (Edwards and Vogt, 1988).

Lee and Djogo (1984) evaluated the effects on income variability of the use of multiple peril crop insurance. They used linear programming to develop risk-return trade-off frontiers for a 600-acre eastern cornbelt grain farm. They found that the use of multiple peril crop insurance could be increased if higher coverage levels were offered in low risk areas. They also found that the use of multiple peril crop insurance was effective in reducing loan losses for lenders.

Leatham, McCarl, and Richardson (1987) using Monte Carlo simulation for Texas wheat/sorghum operations, found that moderately risk-averse farmers would prefer to purchase crop insurance when firm failure became an issue or if yields were extremely variable. They also found that lenders always preferred the use of crop insurance, especially when firm failure was an issue.

Pflueger and Schmiesing (1987) investigated lenders attitudes toward financing the premiums for federal multiple peril and hail/fire crop insurance. The study was based on a survey mailed to agricultural lending officers in South Dakota. They found that (1) lenders believe borrowers are more apt to purchase hail/fire insurance rather than multiple peril insurance (2) borrowers are sensitive to the cost of multiple

peril crop insurance, and (3) that lenders seem to feel that crop insurance is not a viable alternative for producers who are in a strong financial position. The research suggests that lenders' willingness to finance crop insurance premiums is directed toward those farm operations "who can not afford" to self insure against crop loss. It also suggests that lenders attitudes toward financing crop insurance is affected by the borrower's financial risk class.

Conceptual Model

The conceptual model developed for this thesis shows possible relationships among environmental factors associated with a particular farm, farm characteristics, and the farm manager's risk management decisions. It is hypothesized that a farm manager will choose to use or not to use various risk management tools depending upon environmental factors, farm factors, financial factors, and other risk management decisions. The conceptual model is outlined in Figure 2.1. The conceptual model leads to the development of hypothesized relationships regarding the use of the selected risk management tools, which are outlined in Chapter III.

Environmental factors are presumed to affect the use of risk management tools in a uniform fashion across the area of the study. This assumption is required, in part, due to a lack of site specific environmental data. Therefore, this thesis focuses on farm resource factors, farm policy preferences,

financial status, and use of other risk management tools to explain the use of risk transfer tools. Farm policy preferences are explored more fully in studies by Edelman and Lasley (1988) and by Orazem, Otto, and Edelman (1988).

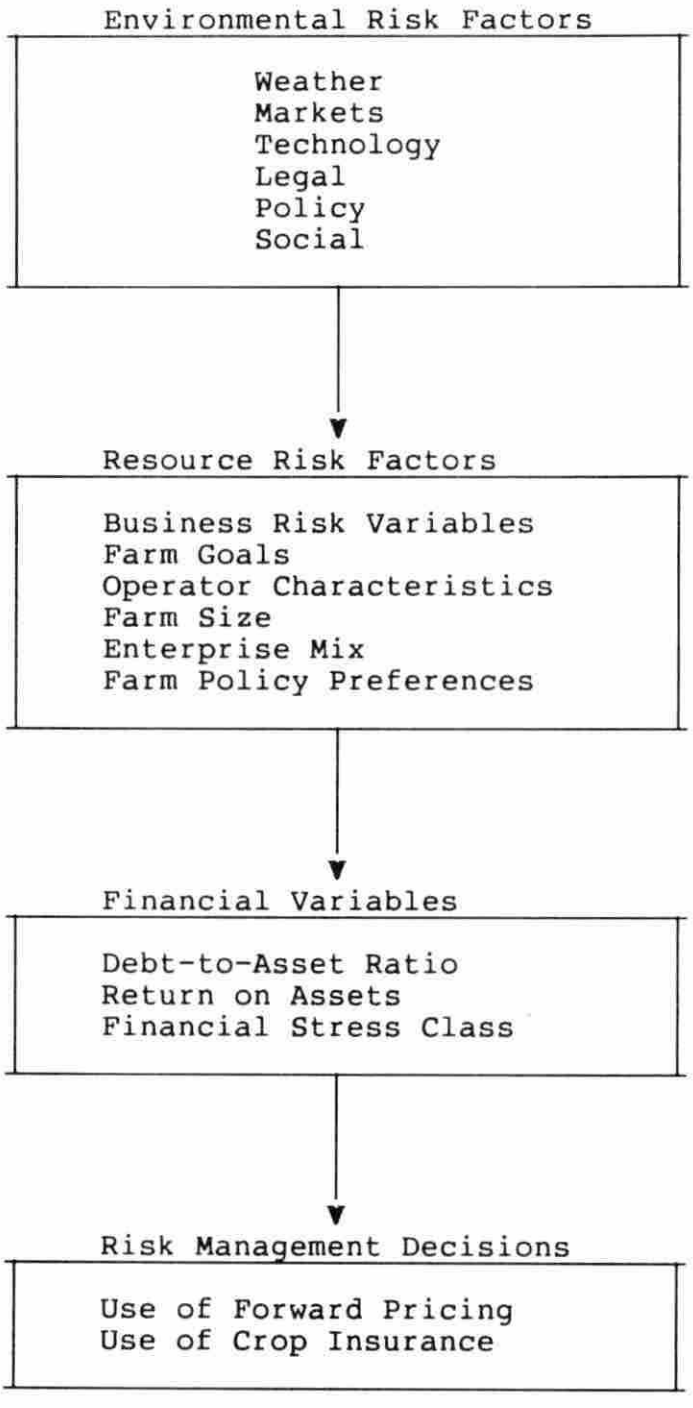

Figure 2.1. Conceptual Model Used in Developing Hypotheses

CHAPTER III. EMPIRICAL METHODS

The Data

The empirical analysis in this thesis is based on data obtained from a survey of Iowa farmers and their financial status. The survey was conducted in April 1988, by Iowa State University in cooperation with the Iowa Office of Agricultural Statistics. The survey was mailed to 5,000 Iowa farm operators. About 1,000 surveys were returned, and 551 surveys had complete balance sheet and income data for the financial analysis. Compared to the Census of Agriculture, the sample under-represents farm operations under 50 acres and farm operators under 35 years old, so it is more representative of established commercial farms. The distribution of farm operations by age and acre categories for the sample is compared to the 1982 Census in Table 3.1. The distributions for the 1987, 1986, and 1985 finance surveys are also included They show a fairly consistent sample from year to year. Possible structural changes due to the farm finance crisis make comparisons with the 1982 census somewhat dubious.

The completed surveys provided farm income statement and beginning and ending balance sheet data. The 1988 survey also asked questions concerning the use of marketing strategies, crop insurance, attitudes toward marketing institutions, and farm policy preferences. The survey instrument is shown in the Appendix.

Table 3.1. Selected Comparisons Between the 1982 Census and the 1985-1988 Iowa Farm Finance Survey Responses (Edelman and Olsen, 1988)

	1985 Survey	1986 Survey	1987 Survey	1988 Survey	1982 Census
Farm Size (acres operated)		Distribution (%)			
Under 50	1.1	1.7	1.7	3.1	17.6
50-179	15.2	16.5	15.8	13.2	26.8
180-499	54.0	51.9	49.9	48.5	40.1
500-999	25.0	24.4	27.1	27.2	12.9
Over 1000	4.7	5.4	5.5	7.9	2.7
Average	433	424	445	463	283
Age of Operator					
Under 35	5.8	7.3	5.4	6.0	22.5
35-44	16.3	17.4	14.5	15.6	19.5
45-54	26.6	23.9	25.1	26.4	22.6
55-64	37.7	37.5	38.1	33.8	23.9
Over 65	13.7	13.8	16.8	18.2	11.5
Average	54	53	54	54	48

Dependent Variables

The initial analysis of the use of marketing instruments and crop insurance included cross-tabulations of the use of each business risk instrument by several classification variables, including age, total acres, gross sales, debt-to-asset ratio, cash flow to equity ratio, management return, and financial stress classes. In the development of the marketing and crop insurance logistic regression models, simple linear regression was first used to determine the relevant dependent and independent variables. A system of hypothesized models were then developed. The remainder of this chapter defines the dependent and independent variables used in this thesis, the hypothesized relationships, and the models tested.

Forward pricing

Table 3.2 contains the questions from the 1988 Iowa Farm Finance Survey concerning whether farmers use various forward pricing instruments for each of four enterprise groups: grain, hogs, feeder cattle, and fed cattle.

Forward cash contracts, price later contracts, and minimum price contracts are three types of forward contracts, so another variable was created and coded "1" if any one of the three types were used and "0" if not. Variables were also created to indicate use of forward contracts, futures hedges, and futures options for the whole farm. This variable was coded "1" if the instrument was used for any of the enterprise

Table 3.2. Question 15: 1988 Iowa Farm Finance Survey

Which of the following marketing tools have you used in pricing grain or livestock during the last two years?

	Grain	Hogs	Feeder Cattle	Fed Cattle
a. Cash marketing or government loans only.....				
b. Forward cash contracts.....				
c. Price later contracts.....				
d. Minimum price contracts.....				
e. Futures market for hedging.....				
f. Agricultural commodity options.				

groups and coded "0" if not. If none of the forward pricing instruments were used, the "cash marketing or government loans only" variable was coded "1" to indicate a positive response, otherwise "0".

The marketing tool variables that were used as dependent variables in the logistic regression models are summarized below. The use of marketing tools to sell feeder cattle was not included in the regression analysis because of the small number of respondents that sold feeder cattle.

1. FWDPRICE = 1 if the farm used either forward contracts, futures hedges, or futures options in marketing produce in the last two years.

   = 0 otherwise.

2. FWDCONTR = 1 if the farm used forward contracts in marketing produce in the last two years.

   = 0 otherwise.

3. FUTHEDGE = 1 if the farm used futures markets for hedging in marketing produce in the last two years.

   = 0 otherwise.

4. FTOPTION = 1 if the farm used futures options in marketing produce in the last two years.

   = 0 otherwise.

5. FWDPRICG = 1 if the farm used forward contracts, futures hedges, or futures options to market grain in the last two years.

   = 0 otherwise.

6. FWDCTG = 1 if the farm used forward contracts in marketing grain in the last two years.

   = 0 otherwise.

7. FHEDGEG = 1 if the farm used futures markets for hedging grain in the last two years.

   = 0 otherwise.

8. FOPTIONG = 1 if the farm used futures options for marketing grain in the last two years.

   = 0 otherwise.

9. FWDPRICH = 1 if the farm used forward contracts, futures hedges, or futures options in marketing hogs in the last two years.

   = 0 otherwise.

10. FWDCTH = 1 if the farm used forward contracts in marketing hogs in the last two years.

    = 0 otherwise.

11. FHEDGEH = 1 if the farm used futures markets for hedging hogs in the last two years.

    = 0 otherwise.

12. FOPTIONH = 1 if the farm used futures options for marketing hogs in the last two years.

    = 0 otherwise.

13. FWDPRICC = 1 if the farm used forward contracts, futures hedges, or futures options in marketing fed cattle in the last two years.

    = 0 otherwise.

14. FWDCTC = 1 if the farm used forward contracts in marketing fed cattle in the last two years.

    = 0 otherwise.

15. FHEDGEC = 1 if the farm used futures markets for hedging fed cattle in the last two years.

    = 0 otherwise.

16. FOPTIONC = 1 if the farm used futures options for marketing fed cattle in the last two years.

= 0 otherwise.

Crop insurance

Table 3.3 contains the questions from the survey pertaining to the use of private hail/fire and federal multi-peril crop insurance. Each insurance variable was coded "1" if it was used and "0" if it was not used.

A variable to indicate all possible combinations of use of the two types of crop insurance was also created. Values for this variable are summarized below.

INSCLASS = 3 if the farm purchased both hail/fire and multi-peril crop insurance in the last two years.

= 2 if the farm purchased only multi-peril crop insurance in the last two years.

= 1 if the farm purchased only hail/fire crop insurance in the last two years.

= 0 if the farm did not purchase either multi-peril or hail/fire crop insurance in the last two years.

An additional regression model was constructed for forward contracting crop insurance. Question 18 on the survey is shown in Table 3.3. This variable was coded "0" to indicate a "no" or "does not apply" response and coded "1" to indicate a "yes" response. The regression was run to test who might be interested in purchasing such insurance. The forward contracting crop insurance variable is summarized below.

Table 3.3. Question 20: 1988 Iowa Farm Finance Survey

During the past two years, have you purchased the following?

	Yes	No
a. Private hail/fire crop insurance.....		
b. Federal multi-peril crop insurance.....		

Question 18: 1988 Iowa Farm Finance Survey

If crops were forward contracted during the last two years:

	Yes	No	Does Not Apply
c. Would you consider forward contracting a larger portion of your marketing if insurance were available to limit losses during a short crop?".....			

FCINSUR = 1 if the farm operator indicated that he would consider purchasing forward contracting crop insurance.

= 0 if the farm operator indicated that he would not buy forward contracting crop insurance or the question did not apply.

Independent Explanatory Variables

Independent variables used in the various marketing models the crop insurance model, and the forward contracting insurance model include those listed below, which are continuous unless otherwise specified:

1. AGE = age of the farm operator.
2. GROSALES = dollar amount of gross farm sales for all farm produce.
3. CROPS = percent of total gross farm sales that were from crop sales.
4. PORK = percent of total gross farm sales that were from hog sales.
5. BEEF = percent of total gross farm sales that were from cattle sales.
6. PCTRENT = percent of total acres operated that were rented.
7. DAR88 = debt-to-asset ratio on January 1, 1988.
8. ROAAT = return on assets (after tax).
9. FINSTRCL = 1 if the farm operation is classified as severely stressed or in a weak financial position according to the classification system used for the "1988 Iowa Farm Finance Survey."

   = 0 if the farm operation is classified as in a stable or strong financial position according to the classification system used for the "1988 Iowa Farm Finance Survey."

10. OTHFWDP = 1 if other forward pricing instruments were used in the last two years, other than the particular forward pricing instrument being tested.

= 0 otherwise.

11. INSURNCE = 1 if either hail/fire or multi-peril crop insurance was purchased in the last two years.

= 0 otherwise.

12. DECOUPLE = 1 if the survey respondent agrees with moving to a market oriented policy by decoupling and phasing down income supports over a period of years.

= 0 if the survey respondent disagrees with or is not sure about moving to a market oriented policy by decoupling.

13. MANDCONT = 1 if the survey respondent agrees with the US implementing higher price supports and mandatory production controls if approved in a farmer referendum.

= 0 if the survey respondent disagrees with or is not sure about implementing mandatory production controls, if approved in a farmer referendum.

14. PCTFC = percent of the crop forward contracted prior to harvest, for those that forward contracted crops during the last two years.

Note that OTHFWDP will take on a different value depending on which forward pricing instrument is being tested. It also only refers to other forward pricing instruments for the particular commodity be tested.

Hypothesized Relationships

In accordance with the conceptual model presented in Chapter II, it is possible to hypothesize relationships between the dependent and independent variables. The following hypothesized relationships are used to define the empirical models tested.

Farm factors

1. Age is hypothesized to be negatively correlated with the use of forward pricing mechanisms and crop insurance. Younger farmers are likely to experience greater levels of financial risk, due to the use of debt financing. Therefore, they would be more likely to use tools to decrease business risk in order to decrease total risk. Also, younger farmers are likely to have more education relative to the use of forward pricing mechanisms and crop insurance.

2. Farm size, as measured by total acres operated or gross farm sales, is hypothesized to be positively correlated with the use of business risk tools. This is because larger farmers tend to have narrower profit margins, have more income at stake, and are also likely to derive a higher percentage of their income from the farm. Smaller operations are likely to be more dependent on off-farm sources of income, which should result in a less variable income stream. In addition, larger farms would spread the time and expenditure necessary to gather market information over more units of production, resulting in

lower marketing costs per unit. Finally, futures market participants are required to buy certain minimum amounts, depending on the contract size, so smaller farm operations may not produce enough volume to utilize such instruments.

3. The size of enterprise relative to total farm size is hypothesized to be positively correlated with the use of forward pricing mechanisms for that particular enterprise. This is measured by the gross sales for the enterprise as a percent of total gross farm sales.

4. Rented acres as a percent of total acres is hypothesized to be positively correlated with the use of crop business risk tools. As rented acres increase, the risk of inadequate income to make cash rent payments also increases.

Farm financial factors

1. The debt-to-asset ratio is hypothesized to be positively correlated with the use of business risk tools. Farm operations with increasing levels of financial risk, as measured by the DA ratio, would likely use such business risk tools to reduce the total variability of income.

2. Return on assets is hypothesized to be positively correlated with the use of business risk tools. Return on assets is a measure of the managerial ability of the farm operator, independent of the financing decision.

3. Financial stress (as measured by solvency and liquidity) is hypothesized to be positively correlated with the use of business risk tools. Those under financial stress are

more likely to use business risk adjustment tools to stay in business, especially with the encouragement of their lenders.

Use of other risk management tools

1. The use of one forward pricing mechanism is hypothesized to be positively associated with the use of the other forward pricing tools. In general, the reason for using the various forward pricing tools are similar--the reduction of price variability. Therefore, the factors that induce someone to use a particular forward pricing tool are also likely to encourage use of other forward pricing tools.

2. The use of crop insurance is hypothesized to be positively correlated with the use of forward pricing tools for those who sell grain.

Farm policy preferences

1. Preference for decoupling of farm income protection and price support mechanisms is hypothesized to be positively correlated with the use of forward pricing tools, for those who sell grain. Those that use the private risk management tools are more likely to benefit from more variable, market oriented prices.

2. Preference for mandatory controls is hypothesized to be negatively correlated with the use of forward pricing tools, for those who sell grain. Those that do not use such tools are more likely to prefer that the government assume the responsibility of stabilizing prices.

Maximum Likelihood Logistic Regression

Maximum likelihood logistic regression was used, rather than ordinary least squares, because the dependent variables in the marketing and forward contract insurance models are binary (values of 0 or 1) and the dependent variable in the crop insurance is ordinal (values of 0, 1, 2, or 3). Again, the binary marketing and forward contract insurance variables indicate a positive or negative response, and the ordinal crop insurance variable indicates all combinations of crop insurance usage. The logistic regression model requires fewer assumptions that the linear discriminate model and is the appropriate technique to use when the dependent variable is binary or ordinal (Harrell, 1986; Lines and Zulauf, 1985).

Maximum likelihood logistic regression prediction equations are based on the cumulative logistic probability function (Pindyck and Rubinfeld, 1981). The logit technique transforms the value of the independent variables from continuous variables with an unlimited range of possible values to a probability which can range from zero to one. The logit technique is based on logarithms, which are positive monotonic transformations. Therefore, the regression coefficients reveal some characteristics of the underlying probability of the dependent variable taking on a particular value, given a particular value of the independent variable (Pindyck and Rubinfeld, 1981).

Marketing Models Tested

Logistic regression was used to test for significant relationships between the use of particular marketing instruments and demographic, farm size, financial and business risk variables, as well as farm policy preferences. The models tested are described in this section. Many variables such as age, gross farm sales, and debt-to-asset ratio are in every model. However, some variables only enter into particular models, since some hypothesized relationships are only relevant for grain marketing and not for livestock marketing.

All farms in the survey sample are represented in Table 3.4, with the dependent variable as a function of the independent variables listed. A "+" or "-" indicates the hypothesized relationship as outlined in the preceding section, and "NA" indicates that the variable does not apply. The models for grain marketing are shown in Table 3.5. The models for hog marketing are shown in Table 3.6. The fed cattle marketing models are shown in Table 3.7.

Insurance Models

Maximum likelihood logistic regression was also the appropriate technique to use for the crop insurance model, since the dependent variable--INSCLASS--is ordinal, with the possible values, "0", "1", "2", and "3". The particular crop insurance model tested and hypothesized relationships are represented in Table 3.8.

Maximum likelihood logistic regression was used to test for significant characteristics of those who might be likely to purchase forward contracting insurance. The hypothesized relationships for this model are presented in Table 3.8.

The remainder of the thesis presents the empirical results and the final summary and conclusions.

Table 3.4. Use of Marketing Tools: Models Tested for All Enterprises and Hypothesized Relationships

Dependent Variable	FWDPRICE	FWDCONTR	FUTHEDGE	FTOPTION
Independent Variables				
AGE	-	-	-	-
GROSALES	+	+	+	+
CROPS	+	+	+	+
PCTRENT	+	+	+	+
DAR88	+	+	+	+
ROAAT	+	+	+	+
FINSTRCL	+	+	+	+
OTHFWDP	NA	+	+	+
INSURNCE	+	+	+	+
DECOUPLE	+	+	+	+
MANDCONT	-	-	-	-

Table 3.5. Use of Marketing Tools: Grain Models Tested and Hypothesized Relationships

Dependent Variable	FWDPRICG	FWDCTG	FHEDGEG	FOPTIONG
Independent Variables				
AGE	-	-	-	-
GROSALES	+	+	+	+
CROPS	+	+	+	+
PCTRENT	+	+	+	+
DAR88	+	+	+	+
ROAAT	+	+	+	+
FINSTRCL	+	+	+	+
OTHFWDP	NA	+	+	+
INSURNCE	+	+	+	+
DECOUPLE	+	+	+	+
MANDCONT	-	-	-	-

Table 3.6. Use of Marketing Tools: Hog Models Tested and Hypothesized Relationships

Dependent Variable	FWDPRICH	FWDCTH	FHEDGEH	FOPTIONH
Independent Variables				
AGE	-	-	-	-
GROSALES	+	+	+	+
PORK	+	+	+	+
DAR88	+	+	+	+
ROAAT	+	+	+	+
FINSTRCL	+	+	+	+
OTHFWDP	NA	+	+	+

Table 3.7. Use of Marketing Tools: Fed Cattle Models Tested and Hypothesized Relationships

Dependent Variable	FWDPRICC	FWDCTC	FHEDGEC	FOPTIONC
Independent Variables				
AGE	-	-	-	-
GROSALES	+	+	+	+
BEEF	+	+	+	+
DAR88	+	+	+	+
ROAAT	+	+	+	+
FINSTRCL	+	+	+	+
OTHFWDP	NA	+	+	+

Table 3.8. Crop Insurance and Forward Contract Insurance Models Tested and Hypothesized Relationships

Dependent Variable	INSCLASS	FCINSUR
Independent Variables		
AGE	-	-
GROSALES	+	+
CROPS	+	+
PCTRENT	+	+
DAR88	+	+
ROAAT	+	+
FINSTRCL	+	+
FWDPRICE	+	+
INSURNCE	NA	+
DECOUPLE	+	+
MANDCONT	+	+
PCTFC	NA	-

CHAPTER IV. EMPIRICAL RESULTS

This chapter first presents frequency distributions of responses to survey questions on the use of forward pricing instruments, the use of crop insurance, and farmers' attitudes toward forward contracting. Second, the maximum liklihood logistic regression results, which test the hypotheses, are presented.

Frequency Distribution Analysis

Table 4.1 presents the survey results for the questions pertaining to the use of forward pricing tools. The overall sample size of 677 respondents indicates the number of farmers that completed the marketing questions. For each enterprise group, it is possible to estimate the percentage of the sample that market each commodity. Approximately 96 percent of the total sample marketed grain, 32 percent marketed hogs, 19 percent marketed feeder cattle, and 25 percent marketed fed cattle.

Forward pricing is more prevalent in marketing grain than livestock, and 58 percent of those that marketed grain used at least one of the three forward pricing tools: forward contracts, futures hedges, or options. Forward pricing was more prevalent for marketing hogs than cattle, and 29 percent of those that marketed hogs used at least one of the forward pricing tools. Feeder cattle were least likely to be

Table 4.1. Use of Forward Pricing Instruments during the Last Two Years by Enterprise and for All Enterprises Combined (Edelman and Olsen, 1988)

Percent that use	All	Grain	Hogs	Feeder Cattle	Fed Cattle
n (sample size)	677	650	219	129	166
Forward Price (forward contract, futures hedge, or options)	58.2%	57.7%	28.8%	13.2%	19.9%
Forward contracts (fwd. cash, price later, or minimum price contracts)	52.3	52.6	13.2	3.1	4.8
Forward cash contracts	41.9	41.2	11.4	3.1	3.6
Price later contracts	22.3	22.9	1.4	0.8	0.6
Minimum price contracts	3.2	2.8	1.4	0.8	1.8
Futures market hedging	15.1	11.2	17.8	7.8	15.7
Agricultural commodity options	13.1	11.5	7.8	6.2	8.4

forward priced. Only about 13 percent of those farm operators who sold feeder cattle used at least one of the forward pricing tools.

Use of forward contracts was more prevalent for marketing grain than the use of futures hedges or options. In contrast, livestock forward pricing was more likely to be through the use of futures hedges. The use of forward contracts was relatively greater for marketing hogs than for cattle, and only five percent of those that marketed fed cattle used forward contracts during in the last two years.

Frequencies for the crop insurance questions are presented in Table 4.2. An analysis of the various combinations shows that 28 percent of respondents did not purchase any crop insurance, 32 percent purchased only private hail/fire crop insurance, 11 percent purchased only federal multi-peril crop insurance, and 29 percent purchased both hail/fire and multi-peril crop insurance. Also included in Table 4.2 are the results to questions pertaining to the amount of grain forward contracted before harvest, respondent attitudes toward the risk of a short crop when forward contracting prior to harvest, and whether respondents would be interested in purchasing forward contract insurance for loss proctection during a short crop.

Regression Model Results

The specific logit regression package used for this analysis was LOGIST (Harrell, 1986). Chi-square values are

Table 4.2. Results for Crop Insurance Questions and Additional Forward Contracting Questions (Edelman and Olsen, 1988)

Percent that purchased private hail/fire crop insurance in the last two years (n = 830)	54.1%
Percent that purchased federal multi-peril crop insurance in the last two years (n = 811)	35.6
Percent that were encouraged by a lender to purchase private hail/fire crop insurance in the last two years (n = 815)	13.1
Percent that were encouraged by a lender to purchase federal multi-peril crop insurance in the last two years (n = 804)	11.9

If crops were forward contracted during the last two years:

What portion of the crop that was forward contracted prior to harvest? (n = 333)	16.5%
Does the risk of a short crop cause you to limit the crop forward contracted (% yes) (n = 699)	78.5
Would you consider forward contracting a larger portion of crops if insurance was available to limit losses? (% yes) (n = 485)	39.4

estimated for the regression model, the intercept terms, and for each independent variable. The associated level of significance is also printed out for each chi-square statistic. Finally, a model "R" value is provided which represents the percent of the log likelihood variation explained by the model. This value is analagous to the multiple R-squared coefficient in ordinary least squares analysis, and ranges from zero to one.

The logistic regression coefficients are difficult to interpret but can be transformed into linear probability equations (Barickman, 1985). Further transformation of the regression coefficients might be useful for predictive purposes, but is not done for this analysis. Such transformations would provide more reliable estimates if the data analyzed were longitudinal. For this analysis, the beta coefficients are used (1) to indicate the direction of the relationship between the independent and dependent variables, positive or negative, and (2) whether the relationship is significant.

Overall marketing models

The results for the overall marketing models are presented in Table 4.3. Sample sizes for the regression results are smaller than for the frequency distribution analyses, since inclusion in each regression model depends on having complete data for each of the independent variables tested. The model chi-square values indicate that each of these models was

Table 4.3. Overall Marketing Model Beta Coefficients and Standard Errors (n = 354)

Independent Variables	Dependent Variable FWDPRICE	FWDCONTR	FUTHEDGE	FTOPTION
INTERCEPT	-0.0107	-1.3646	-3.7810***	-2.8736***
(std. err.)	(0.8293)	(0.8515)	(1.2004)	(1.2022)
AGE	-0.0149	-0.0034	-0.0067	-0.0067
	(0.0123)	(0.0124)	(0.0171)	(0.0175)
GROSALES	0.00266**	0.00298***	0.00393***	0.00304**
($000)	(0.00111)	(0.00115)	(0.00119)	(0.00121)
CROPS	0.0134***	0.0197***	-0.0066	-0.0115**
	(0.0038)	(0.0041)	(0.0054)	(0.0058)
PCTRENT	0.6091*	0.6823*	0.8592*	-0.9013
	(0.3586)	(0.3607)	(0.5084)	(0.5504)
DAR88	0.0092*	0.0132***	-0.0099	0.0054
	(0.0051)	(0.0051)	(0.0076)	(0.0058)
ROAAT	-0.0205**	-0.0172*	-0.0071	0.0139
	(0.0100)	(0.0091)	(0.0103)	(0.0142)
FINSTRCL	-0.7005*	-0.8443***	0.7278	-0.1167
	(0.3838)	(0.3988)	(0.5710)	(0.5544)
OTHFWDP	NA	0.9488***	1.8535***	1.2479***
		(0.3090)	(0.4400)	(0.4122)
INSURNCE	0.0031	-0.2839	0.5568	0.6393
	(0.2639)	(0.2764)	(0.3945)	(0.4326)
DECOUPLE	-0.2810	-0.3586	0.6160*	0.2748
	(0.2520)	(0.2578)	(0.3378)	(0.3668)
MANDCONT	-0.4978	-0.8816**	-0.9910	1.0226**
	(0.3447)	(0.3553)	(0.7117)	(0.4917)
Model Chi-Sq.	37.00***	61.88***	54.95***	39.89**
Model R	0.203	0.306	0.346	0.243

*** Significant at the .01 level
** Significant at the .05 level.
* Significant at the .1 level.

significant at the one percent level of significance. A one percent level of significance means that there is a one percent chance that the model is shown as representing the true probability distribution (is significant) when it does not. This is commonly known as the probability of a type II error.

Six out of ten independent variables were significant for the model with FWDPRICE (use of any forward pricing tool) as the dependent variable. These variables included GROSALES (dollar value of gross farm sales), CROPS (the percent of gross sales from crop sales), PCTRENT (the percent of land operated that is rented), DAR88 (debt-to-asset ratio), ROAAT (return on assets), and FINSTRCL (indicating financial stress). The hypothesized relationships held for each of these variables, except for ROAAT and FINSTRCL, which were negatively associated with the use of forward pricing tools.

Eight out of eleven independent variables were significant for the model with FWDCONTR (use of forward contracts) as the dependent variable. These variables included GROSALES, CROPS, PCTRENT, DAR88, ROAAT, FINSTRCL, OTHFWDP (the use of at least one other forward pricing tool) and MANDCONT (preference for manadatory production controls). All of the hypothesized relationships held except for ROAAT and FINSTRCL, which were both negatively associated with the use of forward contracts.

Four out of eleven independent variables were significant for the model with FUTHEDGE (use of futures market hedges) as

the dependent variable. These variables included GROSALES, PCTRENT, OTHFWDP, and DECOUPLE (preference for decoupling farm income support from price supports). The hypotheses held for each of these variables.

Four out of eleven independent variables were significant for the model with FTOPTION (use of agriculture commodity options) as the dependent variable. These variables included GROSALES, CROPS, OTHFWDP and MANDCONT. The use of futures options was positively correlated with MANDCONT (preference for mandatory production controls) which is the opposite of the hypothesized sign. However, MANDCONT was negatively correlated with the dependent variable in each of the other models. This implies that some farm operators hold a different attitude toward use of options versus the other forward pricing tools.

In summary, GROSALES (gross farm sales) was significant and positively correlated in each of the overall marketing models. The larger gross farm sales were, the more likely the farm uses at least one of the forward pricing tools. OTHFWDP (the use of at least one other forward pricing tool, other than the one being tested) was significant and positively correlated with the dependent variable in each model which it entered. This shows that farmers who use one forward pricing tool were likely to use at least one other of the forward pricing tools.

Grain marketing models

Table 4.4 shows the regression results for the grain marketing models. The results of the grain marketing models

were similar to the overall marketing model results in who each model chi-square was significant at the one percent level. Also, gross farm sales was significant and positively correlated in each of the four models. The use of other forward pricing tools was also significant and positively correlated with the use of grain forward pricing tools, for the three applicable models.

Six out of ten independent variables were significant for the model with FWDPRICG (use of any one of the forward pricing tools to market grain) as the dependent variable. These variables included GROSALES, CROPS, PCTRENT, DAR88, ROAAT, and FINSTRCL. However, ROAAT and FINSTRCL were negatively correlated with the use of forward pricing tools to market grain. These signs are the opposite of the hypothesized relationships.

Seven out of eleven independent variables were significant for the model with FWDCTG (use of forward contracts to market grain) as the dependent variable. These variables included GROSALES, CROPS, DAR88, ROAAT, FINSTRCL, OTHFWDP, and MANDCONT. These variables showed signs that were consistant with those hypothesized, except for ROAAT and FINSTRCL, which were negatively correlated with FWDCTG.

Three out of eleven independent variables were significant for the model with FHEDGEG (use of futures market hedges for grain) as the dependent variable. These variables included GROSALES, CROPS and OTHFWDP. The sign for CROPS was not

Table 4.4. Grain Marketing Model Beta Coefficients and Standard Errors (n = 341)

Independent Variables	Dependent Variable FWDPRICG	FWDCTG	FHEDGEG	FOPTIONG
INTERCEPT	-0.6964	-1.4137	-5.8424***	-4.3699***
(std. err.)	(0.8609)	(0.8711)	(1.4727)	(1.3551)
AGE	-0.0074	-0.0015	0.0047	0.0032
	(0.0125)	(0.0125)	0.0196	(0.0190)
GROSALES	0.00298***	0.00329***	0.00435***	0.0033***
($000)	(0.00115)	(0.00118)	(0.00113)	(0.00127)
CROPS	0.0164***	0.0183***	-0.0122*	-0.0058
	(0.0041)	(0.0042)	(0.0069)	(0.0066)
PCTRENT	0.6291*	0.5876	0.9426	-0.5307
	(0.3650)	(0.3637)	(0.5889)	(0.5788)
DAR88	0.0110**	0.0132**	-0.0030	0.0036
	(0.0054)	(0.0054)	(0.0086)	(0.0060)
ROAAT	-0.0191*	-0.0174*	-0.0070	0.0076
	(0.0102)	(0.0091)	(0.0116)	(0.0140)
FINSTRCL	-0.7640*	-0.7879*	0.0163	0.2805
	(0.3965)	(0.4022)	(0.6987)	(0.5827)
OTHFWDP	NA	0.6789**	1.2128**	0.0256**
		(0.3439)	(0.4882)	(0.4463)
INSURNCE	-0.1464	-0.2456	0.6703	0.9163*
	(0.2728)	(0.2765)	(0.4875)	(0.5195)
DECOUPLE	-0.1860	-0.2092	0.5667	0.5855
	(0.2570)	(0.2592)	(0.3902)	(0.4089)
MANDCONT	-0.4857	-0.7976**	-0.5841	1.0900**
	(0.3521)	(0.3565)	(0.7173)	(0.5294)
Model Chi-sq.	38.14***	49.43***	39.44***	33.98***
Model R	0.215	0.264	0.261	0.189

*** Significant at the .01 level.
** Significant at the .05 level.
* Significant at the .1 level.

consistant with the hypothesis. This means that those that used futures markets to hedge grain were likely to derive more of their income from livestock sales, relative to the rest of the sample.

Four out of eleven independent variables were significant for the model with FOPTIONG (use of futures options for marketing grain) as the dependent variable. These variables included GROSALES, INSURNCE, OTHFWDP, and MANDCONT. MANDCONT was positively correlated with FTOPTONG, which is the opposite of the hypothesized relationship.

In summary, for the grain marketing models, as with the overall marketing models, GROSALES and OTHFWDP were significant and positively correlated at the five percent level for each of the models in which they entered. MANDCONT had a significant negative correlation with the use of forward contracts (as hypothesized) and a significant positive correlation with the use of agricultural commodity options (the opposite of what was hypothesized). This is consistant with the overall marketing models. Finally, CROPS was negatively correlated with the use of futures hedges to market grain, so the percentage of gross sales from livestock was positively correlated with the use of grain futures hedges.

Hog marketing models

Table 4.5 shows the regression results for the hog marketing models. The hog marketing models did not have as high of R values, or predictive abilitiy, as the marketing

models for all farm observations and grain marketing models. A major difference is that gross farm sales was significant in only two of four hog marketing models. The model chi-square with FWDPRICH (the use of one or more of the forward pricing tools to market hogs) as the dependent variable was significant at the ten percent level. The model chi-square with FWDCTH (the use of forward contracts to market hogs) as the dependent variable was not significant. However, the model with FHEDGEH (the use of futures hedges to market hogs) and the model with FOPTION (the use of commodity options to market hogs) as dependent variables were each significant at the one percent level.

Two out of seven independent variables were significant for the model with FWDPRICH as the dependent variable. However, the model chi-square was not significant. The significant variables included AGE (farm operator age) and GROSALES. This is the first model discussed for which AGE has been significant, and younger operators were more likely to use forward pricing tools to market hogs, as expected.

There were no significant variables for the model with FWDCTH as the dependent variable. The model chi-square was not significant as well.

Four out of seven independent variables were significant for the model with FHEDGEH as the dependent variable. These variables included GROSALES, OTHFWDP, AGE and PORK (the percent of gross sales from pork). All of these relationships were as

Table 4.5. Hog Marketing Model Beta Coefficients and Standard Errors (n = 135)

Independent Variables	Dependent Variable FWDPRICH	FWDCTH	FHEDGEH	FOPTIONH
INTERCEPT	0.8240	-0.5972	-0.2962	-6.6671***
(std. err.)	(1.1941)	(1.6622)	(1.3574)	(2.4006)
AGE	-0.0462**	-0.0418	-0.0408*	0.0023
	(0.0204)	(0.0281)	(0.0241)	(0.0371)
GROSALES	0.00260*	0.00120	0.00315**	0.00332
($000)	(0.00133)	(0.00187)	(0.00150)	(0.00233)
PORK	0.0066	0.0117	-0.0014	0.0202
	(0.0081)	(0.0117)	(0.0094)	(0.0164)
DAR88	-0.0030	-0.0130	-0.0046	0.0306*
	(0.0091)	(0.0126)	(0.0103)	(0.0177)
ROAAT	-0.0242	-0.0122	-0.0213	0.0071
	(0.0160)	(0.0126)	(0.0172)	(0.0327)
FINSTRCL	0.5955	-0.9708	0.1456	-2.4201*
	(0.7188)	(0.9799)	(0.8335)	(1.4570)
OTHFWDP	NA	0.2486	1.2548**	2.9669***
		(0.6214)	(0.5061)	(0.9133)
Model Chi-Square	12.43	5.94	20.03***	28.07***
Model R	0.082	0.0	0.202	0.403

*** Significant at the .01 level.
** Significant at the .05 level.
* Significant at the .1 level.

hypothesized, except for PORK, which indicates that farms that derive greater percentages of their gross income from hog marketings are less likely to use futures hedges in marketing hogs. Conventional wisdom and the model results suggest that continuous hog marketings reduces marketing risks and use of hedging in hog contracts.

Three out of seven independent variables were significant for the model with FOPTIONH as the dependent variable. These variables included OTHFWDP, DAR88 and FINSTRCL. The hypothesized signs held, except for FINSTRCL, which was negatively correlated with the use of futures options to market hogs.

In summary, the models show that farm size, as measured by gross sales, was not as strongly associated strongly with forward pricing of hogs as it is for forward pricing grain. However, age showed a significant negative relationship with the use of forward pricing tools for hogs, while no significant relationships were found between age and the use of marketing risk adjustment tools for any of the other enterprises. Also, OTHFWDP was not significant in the hog forward contracting model (FWDCTH as the dependent variable). Therefore, farmers that used forward contracting to market hogs were not as likely to use either futures hedges or commodity options. However, the use of futures hedges and commodity options were significant and positively correlated with each other.

Fed cattle marketing models

Table 4.6 shows the regression results for the fed cattle marketing models. The R values were higher for the fed cattle marketing models than for the hog models. Each of the fed cattle model chi-squares were significant at the one percent level of significance. However, the fed cattle forward contracting model had no significant variables and had a lower R value than the other fed cattle marketing models.

Two out of seven independent variables were significant for the model with FWDPRICC (the use of any one of the three forward pricing tools to market fed cattle) as the dependent variable. GROSALES and BEEF (the percent of gross sales from the sale of cattle) were each significant and positively correlated with FWDPRICC, as hypothesized.

As already mentioned, there are no significant variables in the model with FWDCTC (use of forward contracts in marketing fed cattle) as the dependent variable. Also, as shown earlier in Table 4.1, the use of forward contracts is not very prevalent for marketing cattle.

Three out of seven independent variables were significant for the model with FHEDGEC (the use of futures hedges to market fed cattle) as the dependent variable. GROSALES and OTHFWDP and BEEF were significant and positively correlated. These relationships were all as hypothesized. This model had a higher R value (43%) than all of the other models tested in this thesis.

Table 4.6. Fed Cattle Marketing Model Beta Coefficients and Standard Errors (n = 98)

Independent Variables	Dependent Variable FWDPRICC	FWDCTC	FHEDGEC	FOPTIONC
INTERCEPT	-2.1813	-4.7926	-2.3535	-2.0533
(std. err.)	(1.5021)	(4.2430)	(2.2491)	(1.9277)
AGE	-0.0462	-0.0284	-0.0241	-0.0437
	(0.0131)	(0.0710)	(0.0359)	(0.0350)
GROSALES	0.00435**	0.00264	0.00639**	0.00080
($000)	(0.00184)	(0.00272)	(0.00251)	(0.00171)
BEEF	0.0225**	0.0340	0.0235*	0.0251*
	(0.0105)	(0.0265)	(0.0140)	(0.0146)
DAR88	0.0066	0.0094	-0.0343	0.0127
	(0.0144)	(0.0377)	(0.0230)	(0.0196)
ROAAT	0.0040	0.0161	-0.0276	0.0135
	(0.0211)	(0.0548)	(0.0364)	(0.0268)
FINSTRCL	-1.1588	-6.1829	0.1456	-1.0169
	(1.3329)	.	(0.8335)	(1.6693)
OTHFWDP	NA	0.9251	2.5498***	2.0066**
		(1.5466)	(0.9405)	(0.8976)
Model Chi-Square	18.02***	27.61***	33.30***	28.84***
Model R	0.246	0.086	0.437	0.348

*** Significant at the .01 level.
** Significant at the .05 level.
* Significant at the .1 level.

Two out of seven independent variables were significant for the model with FOPTIONC (the use of agricultural commodity options to market fed cattle) as the dependent variable. OTHFWDP and BEEF were significant and positively correlated, as hypothesized.

In summary, hedging and options are the preferred forward pricing tools used by fed cattle producers. The explanatory power of the results of these two models are consistant with this conclusion. Gross farm sales and other forward pricing variables were the most relevant variables to predict the use of forward pricing mechanisms in marketing fed cattle. Both of these variables were positively correlated with the use of forward pricing. Also, the percentage of gross farm sales from beef was significant in explaining the use of forward pricing tools for marketing fed cattle and was also positively correlated.

Feeder cattle models

After an initial run of feeder cattle marketing models, it was determined that there was not a sufficient sub-sample of feeder cattle producers or use of feeder cattle contracts to merit analysis of the results.

Crop insurance models

Two crop insurance regression models were used to test for significant relationships between the use of varying levels of crop insurance coverage and farm operator characteristics. INSCLASS was the dependent variable, with values ranging from

zero to three. When the dependent variable is multichotomous (as in the crop insurance model) the regression coefficient represents the probability of an observation falling into one class relative to the probability of falling into a base reference class. The base class for the crop insurance model is "0", which represents no crop insurance coverage. The first model is an unrestricted model which included all independent variables that were used for the marketing models. The second model is a restricted model which excluded the variables from the first model that were not significant or nearly significant. More observations were available in the restricted model since fewer variables were tested. The results of the two models are shown in Table 4.7.

In the first model, CROPS and DAR88 were significant and positively correlated with the use of increasing levels of crop insurance. In addition, DECOUPLE was significant and negatively correlated with increasing levels of crop insurance.

In the second model, all independent variables were significant. PCTRENT, CROPS, and DAR88 were all positively correlated with the use of increasing levels of crop insurance. DECOUPLE was negatively correlated with increasing levels of crop insurance coverage.

The results indicate that crop farmers are more likely to purchase crop insurance, as expected. Also, farmers that rent a greater proportion of operated land were more likely to

Table 4.7. Crop and Forward Contract Insurance Model Beta Coefficients and Standard Errors

	Dependent Variable			
Independent Variables	INSCLASS (n = 354)	INSCLASS (n = 504)	FCINSUR (n = 171)	FCINSUR (n = 300)
ALPHA1	0.7258	-0.1899	NA	NA
(std. err.)	(0.6711)	(0.2103)		
ALPHA2	-0.6867	-1.5265*	NA	NA
	(0.6711)	(0.2207)		
ALPHA3	1.2239*	-2.0749*	NA	NA
	(0.6730)	(0.2292)		
INTERCEPT	NA	NA	-0.5585	-0.5059
			(1.3051)	(0.6780)
AGE	-0.0054	NA	-0.0222	-0.0195*
	(0.0099)		(0.0188)	(0.0110)
GROSALES	0.00007	NA	0.00154	0.00181**
($000)	(0.00072)		(0.00102)	(0.00083)
CROPS	0.0073**	0.0085*	-0.0021	NA
	(0.0032)	(0.0024)	(0.0062)	
PCTRENT	0.4195	0.8372*	-0.2611	NA
	(0.2935)	(0.2166)	(0.5403)	
DAR88	0.0080**	0.0096*	0.0005	NA
	(0.0036)	(0.0026)	(0.0066)	
ROAAT	-0.00077	NA	0.0069	NA
	(0.00637)		(0.0112)	
FINSTRCL	-0.2439	NA	0.4773	0.1633
	(0.3101)		(0.5895)	(0.2897)

** Significant at the .05 level.
* Significant at the .1 level.

Table 4.7. (continued)

	Dependent Variable			
Independent Variables	INSCLASS (n = 354)	INSCLASS (n = 504)	FCINSUR (n = 171)	FCINSUR (n = 300)
INSURNCE	NA	NA	1.6880*** (0.4430)	1.0566*** (0.2993)
FWDPRICE	-0.0328 (0.2089)	NA	-0.1998 (0.4946)	NA
DECOUPLE	-0.5162** (0.2104)	-0.3682* (0.1672	0.1554 (0.3730)	NA
MANDCONT	-0.2758 (0.2940)	NA	0.7028 (0.5419)	0.6299* (0.3331)
PCTFC	NA	NA	0.0069 (0.0104)	NA
Model Chi-Square	23.71*	57.27*	25.25**	26.58***
Model R	0.062	0.190	0.072	0.211

*** Significant at the .01 level.

purchase greater amounts of crop insurance coverage. The debt-to-asset ratio was also positively correlated with increased use of crop insurance, which is consistent with the hypothesis.

Forward contract insurance models

Two models were used to test for significant relationships between a willingness to purchase insurance to protect against a short crop when forward contracting (FCINSUR) and the independent variables. Similar to the crop insurance model, the first model was unrestricted and included all variables that were used to test the use of marketing tools. The second model was restricted and tested only those independent variables that were found to significant or nearly significant. Also included in the first model was PCTFC, which indicates the percent of the crop that is forward contracted prior to harvest, if forward contracts are used. The model results are shown in Table 4.6.

In the first model, only INSURNCE (the use of either hail/fire or multi-peril insurance in the last two years) was found to be significant. Those that purchase crop insurance were more likely to be willing to purchase insurance to protect against a short crop when forward contracting. The model chi-square was significant.

In the second model, AGE, GROSALES, INSURNCE, and MANDCONT were significantly correlated with FCINSUR. AGE was negatively correlated, while the other variables were positively

correlated with FCINSUR.

The results show that those that purchase crop insurance, younger farm operators, larger farm operations, and those that favor mandatory production controls are more likely to be interested in purchasing insurance to protect against a short crop when forward contracting, if such a product were offered.

CHAPTER V. SUMMARY AND CONCLUSIONS

This thesis analyzes the relationships among the use of forward pricing tools and crop insurance, and farm characteristics, financial position, and policy preferences.

A goal of current farm programs is to become more market-oriented. Some have suggested that federal crop insurance and private marketing tools are expected to replace federal assistance. The use of forward pricing tools and crop insurance might ease this transition to more variable prices and incomes. This study focuses on analyzing who is using such tools.

The results may also be of interest to agribusinesses that wish to better understand what products are desired by various segments of the farmer demand. Finally, the results may be of interest to farmers and educators.

The methods used to determine factors significantly related with the various risk transfer tools include frequency distribution analysis and maximum likelihood logistic regression analysis. The regression models tested for significant linear relationships between the use of each marketing tool or level of crop insurance coverage and various farm characteristics.

Marketing Model Results

Chi-square values were used to test for significance of each model. These values show that all models were significant

at the five percent level, except for the hog and fed cattle forward pricing and forward contracting models, which were not significant.

The model R values (which indicate the percent variation explained by the model) ranged from zero for the hog forward contracting model to 44 percent for the fed cattle futures hedge model. For the model with forward pricing as the dependent variable, the R value was 20 percent. A longitudinal data might provide higher R values and greater predictive ability.

Each independent variable was significant in at least one of the marketing models. The results suggest that farm size, as measured by gross farm sales, is the most significant variable associated with the use of forward pricing tools. The use of forward pricing tools is highly correlated with larger farm operations. However, this relationship was not as significant in the case of hog forward pricing tools, where age was more significant.

The use of forward pricing tools was hypothesized to be negatively correlated farm operator age. This held true with every marketing tool, however, age was only significant in the case of hog forward pricing.

The percentage of gross farm sales from crops was significant and negatively correlated with the use of futures hedges to market grain. This indicates that those that market relatively more livestock are more likely to use futures

hedges to forward price their grain. This may be because of the increased familiarity and use of futures markets.

The debt-to-asset ratio was significant and positively correlated with the use of forward pricing tools in many of the models. Return on assets was significant and negatively correlated with the use of many of the forward pricing tools. This is contrary to the hypothesis, and suggests that more profitable farms may be less compelled to use risk transfer tools. However, the data analyzed is cross-sectional, and 1987 was a relatively good year for Iowa farm product prices and incomes. This relationship may or may not hold over time and could only be tested using a longitudinal data series.

Financially stressed operations (as measured by solvency and liquidity classification) were also less likely to use many of the forward pricing instruments. This is the opposite of what was hypothesized and may be due to several factors. The classification system defines many of the highly liquid and high debt operations--that may likely be able to meet current loan obligations--to be financially stressed. Second, some farm operations with relatively low debt-to-asset ratios and low cash flow (and not subject to immediate solvency risk) are classified as financially stressed. Third, off-farm income is included in the liquidity ratio. Farms with off-farm income are likely have a less variable income stream, so there would be less incentive to minimize income variability. Finally, it is possible that farmers who use forward pricing tools may have

avoided becoming financially stressed during the extraordinary financial adjustments experienced in the early to mid-1980's, although this is impossible to test with the data available. The use of other forward pricing tools was significant and positively correlated in most models. However, for the model with hog forward contracts as the dependent variable, the use of other forward pricing tools was not significant.

This is also the case with fed cattle forward contracts. That is, for the model with fed cattle forward contracts as the dependent variable, the use of other forward pricing tools was not significant. These results suggest that those who use forward contracts to market livestock are not as likely to use futures hedges or options.

It was hypothesized that those who favored mandatory controls prefer that the government minimize farm business risk, and should be less likely to use the private risk transfer tools. Those who favored mandatory controls, however, were more likely to use futures options but were less likely to use forward contracts. This suggests that farmers may view forward contracting, futures markets, and futures options markets differently. This has possible implications for suggesting that agribusinesses might target risk management products and services to specific market segments.

It was also hypothesized that those that favor decoupling farm income protection from price supports would be more likely to favor the use of private risk adjustment tools. This

relationship held and was significant for the overall marketing model and in the case of futures market hedges.

Insurance Model Results

The crop insurance model results indicate that farmers who derive a greater percentage of their income from crops, those who rent a greater proportion of total acres operated, and those with higher debt-to-asset ratios are more likely to purchase crop insurance. All of these relationships were as hypothesized.

Those who purchase crop insurance were also likely to be interested in purchasing insurance to protect against a short crop when using forward contracts, if such a product were offered by elevators or insurance companies. This concept would allow farmers to indirectly participate in the options market through a market agency rather that directly participating in the options market. In addition, younger operators, larger farm operations, and farmers who favor mandatory controls were more likely to be interested in purchasing such insurance.

Conclusions and Implications

The results show that there are significant relationships between the use of marketing risk adjustment tools and farm characteristics. In particular, larger farm operations are more likely to be currently using such instruments. This

possibly has important farm policy implications since farm program benefits are usually justified to protect small "family farm" operations. As government farm policy becomes more market-oriented, larger farms may be better prepared to minimize their income variability. Increased educational efforts may needed to help prepare farmers for the transition to more market determined, variable farm prices. An important issue raised for educators who teach marketing seminars is: "Do you focus on smaller, older farmers or on younger, larger farmers?"

Also, there are differences between the use of forward contracting, futures hedges, and commodity options between enterprises. Forward contracting is not very prevalent for marketing livestock but is the most prevalent forward pricing tool in marketing grain.

The use of crop insurance was not significantly associated with farm size. This suggests that smaller operations are less concerned with marketing or price risk and more concerned with production risk. Although federal multi-peril crop insurance is designed to reduce the role of government in providing massive disaster relief to farmers, the widespread drought experienced in 1988 and forthcoming federal assistance indicate that this goal is not completely being met at this time. It also raises questions about the incentives for purchasing crop insurance in the future.

The results also show that farmers who might be interested

in purchasing insurance to protect against a short crop when using forward contracts (if such a product were available) are likely to be those that currently purchase crop insurance.

Suggestions for Further Research

Additional research may be useful in determining why smaller operations do not use business risk adjustment tools as much as larger operations, and whether this is due to scale economies, a lack of interest, age, or education concerning business risk adjustment costs or benefits.

A longitudinal data series could determine whether the relationships presented in this analysis hold over time. Of particular interest, is whether return on assets is negatively correlated with the use of marketing instruments (as it is in this analysis) and, if so, why. Further research might also consider testing the relationships between participation in government farm programs, other behavioral patterns, and the use of risk transfer tools tested herein.

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APPENDIX: 1988 IOWA FARM FINANCE SURVEY INSTRUMENT

1988 FARM FINANCE SURVEY

1. In what county is most of your farming operation located? .....(001)
2. What is your age? .....(002)
3. How many dependents are you supporting (including yourself)? .....(003)
4. How many of these dependents are under 18 years? .....(004)
5. What is the highest level of schooling that you have attended (check one)?

   Wife.....(005) ☐ Grade School ☐ High School ☐ College or Vocational

   Husband.....(006) ☐ Grade School ☐ High School ☐ College or Vocational
6. How many years have you been farming? .....(007)
7. How many acres do you: A. Own.....(008)

   B. Rent from others.....(009)

   C. Rent to others .....(010)

   Total Land You Operate (Item A + B - C).....(011)

3. From your 1987 tax records (1040, 1040F and Form 4797) or farm accounts, please supply the following information on your farm income and expenses:

ITEM	1987 $ VALUE
Gross income (Form 1040F, line 12)	020
Sale of breeding stock (Form 4797, line 18)	021
Interest (Form 1040F, add lines 23a plus 23b)	022
Depreciation (Form 1040F, line 16)	023
Total deductions (Form 1040F, line 36)	024
Off-farm wages (Form 1040, line 7)	025
Off-farm interest (Form 1040, add lines 8 plus 9)	026
Total income (Form 1040, line 22)	027

9. Approximately what **percent** of your 1987 gross farm sales came from each of these sources?

   Crops .....(030) %

   Beef.....(031) %

   Pork .....(032) %

   Dairy.....(033) %

   Other _____ (please specify).....(034) %

   Total ..... 100 %

Appendix. 1988 Iowa Farm Finance Survey (page 1)

10. From your financial statements for the last two years, what was the market value of the farm assets that you own?

	Jan. 1987	Jan. 1988
Crops and livestock for sale (include CCC crops under loan)	040	041
Machinery, equipment, breeding stock	042	043
Land and Buildings	044	045
Total Assets	046	047

11. Please give your outstanding loan balances for real estate and non-real estate debt by type of lender on January 1, 1987 and 1988:

Type of Lender	REAL ESTATE DEBT Jan. 1987	REAL ESTATE DEBT Jan. 1988	NON-REAL ESTATE DEBT Jan. 1987	NON-REAL ESTATE DEBT Jan. 1988
Bank	050 $	051 $	070 $	071 $
Farm Credit System	052 $	053 $	072 $	073 $
Farmers Home Admin	054 $	055 $	074 $	075 $
Insurance Company	056 $	057 $	076 $	077 $
Individual	058 $	059 $	078 $	079 $
CCC and other loans	060 $	061 $	080 $	081 $
Total Debt	062 $	063 $	082 $	083 $

		YES	NO
12. a.	Will you seek operating credit during 1988? (090)	☐	☐
b.	Do you expect difficulty in acquiring operating credit in 1988? (091)	☐	☐
c.	If you have not declared bankruptcy, are you contemplating bankruptcy in the future? (092)	☐	☐

		YES	NO
13.	During the last three years:		
a.	Have you sold land? (100)	☐	☐
	If **yes**, was this sale due to financial stress? (101)	☐	☐
b.	Have you sold equipment or breeding livestock? (102)	☐	☐
	If **yes**, was this sale due to financial stress? (103)	☐	☐
c.	Have you given back land purchased on contract? (104)	☐	☐
d.	Have you renegotiated a land contract? (105)	☐	☐
e.	Have you voluntarily turned assets back to a lender? (106)	☐	☐
f.	Have you received a write-down in principal owed? (107)	☐	☐
g.	Have you received a write-down in interest owed? (108)	☐	☐
h.	Have you received a FmHA loan guarantee? (109)	☐	☐
i.	Have you been foreclosed upon? (110)	☐	☐
j.	Have you declared bankruptcy? (111)	☐	☐

If **yes**, please circle: Chapter 7 11 12 13
(112)

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14. When marketing your commodities, does someone in your farm unit regularly do the following? (Please check)

		Often Used	Sometimes Used	Not Used
a.	Utilize charts of cash price trends (120)	☐	☐	☐
b.	Utilize charts of futures market trends (121)	☐	☐	☐
c.	Use local basis charts (122)	☐	☐	☐
d.	Calculate cost of production (123)	☐	☐	☐
e.	Develop a written marketing plan (124)	☐	☐	☐

15. Which of the following marketing tools have you used in pricing grain or livestock during the last two years?

		Grain	Hogs	Feeder Cattle	Fed Cattle
a.	Cash marketing or government loans only	(130) ☐	(230) ☐	(330) ☐	(430) ☐
b.	Forward cash contracts	(131) ☐	(231) ☐	(331) ☐	(431) ☐
c.	Price later contracts	(132) ☐	(232) ☐	(332) ☐	(432) ☐
d.	Minimum price contracts	(133) ☐	(233) ☐	(333) ☐	(433) ☐
e.	Futures market for hedging	(134) ☐	(234) ☐	(334) ☐	(434) ☐
f.	Agricultural commodity options	(135) ☐	(235) ☐	(335) ☐	(435) ☐

16. Who has primary responsibility for the following?

		Husband	Wife	Other
a.	Keeping the financial records up-to-date (140)	☐	☐	☐
b.	Recording market information and position (141)	☐	☐	☐

17. Please identify the most important factors why you would not use forward contracting in the coming year: (Please check)

		Very Important	Somewhat Important	Not A Factor
a.	Marketing conditions favor other strategies (150)	☐	☐	☐
b.	Fear of lack of knowledge of how they work (151)	☐	☐	☐
c.	Creditors have discouraged their use (152)	☐	☐	☐
d.	Not enough time to do a good marketing job (153)	☐	☐	☐
e.	Too much personal exposure to financial risk (154)	☐	☐	☐
f.	Too much speculation and market manipulation (155)	☐	☐	☐
g.	Morally wrong to use such tools (156)	☐	☐	☐

18. If crops were forward contracted during the past two years:

		Percent	Does Not Apply
a.	What portion of your crop was forward contracted prior to harvest?	(160) ☐	(161) ☐

		Yes	No	Does not Apply
b.	Does the risk of a short crop cause you to limit the portion of crops that you forward contract? (162)	☐	☐	☐
c.	Would you consider forward contracting a larger portion of your marketings if insurance were available to limit losses during a short crop? (163)	☐	☐	☐

19. Have you ever used the following management tools?

		Yes	No
a. Taken soil tests for fertilizer applications	(170)	☐	☐
b. Figured manure/legume credits into fertilization	(171)	☐	☐

20. During the past two years, have you purchased the following?

		Yes	No
a. Private hail/fire crop insurance	(180)	☐	☐
b. Federal multi-peril crop insurance	(181)	☐	☐

21. During the past two years, did a lender encourage you to purchase crop insurance?

		Yes	No
a. Private hail/fire crop insurance	(190)	☐	☐
b. Federal multi-peril crop insurance	(191)	☐	☐

22. What should be the future direction in farm policy?
(Please check one answer for each item.)

		Agree	Not Sure	Disagree
a. Continue present voluntary programs which provide government price and income supports in return for acreage reduction	(200)	☐	☐	☐
b. Move to market-oriented policy by decoupling and phasing down income supports over a period of years	(201)	☐	☐	☐
c. Implement higher price supports and mandatory production controls if approved in a farmer referendum	(202)	☐	☐	☐
d. Target more farm program spending toward the farmers who are financially stressed	(203)	☐	☐	☐

Comments:

- - THANK YOU FOR YOUR COOPERATION - -

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