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Risk Management Programs in Extension

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The evolution of Cooperative Extension Service techniques used to teach decision making in a risky environment is examined. Interviews of selected Cooperative Extension economists indicate that research methods used to evaluate and describe risk are more complex than those used in extension programs. Research is an essential component of the development and implementation of extension programs. Because most producers have some understanding of risk, and many use financial strategies to manage risk, an important product of risk research has been educating extension economists and researchers. When developing risk management programs, it is stressed that "simplicity is powerful."

Key words: decision making, extension, finance, marketing, production, risk, teaching

Introduction

There are no solutions with respect to the future, there are only choices between courses of action, each imperfect, each risky, each uncertain, and each requiring different efforts and involving different costs. But nothing can help the manager more than to realize what alternatives are available to him and what they imply.

(Peter F. Drucker, *Management: Tasks, Responsibilities, Practices*, p. 515)

Most producers agree that risk is part of the business environment and must be managed. Successful producers learn to make decisions in a risky environment and a few view risk as an opportunity. How risk is managed varies greatly depending on who is making the decision and what forces are interacting in the decision process.

Cooperative Extension economists have strived to teach decision makers how to evaluate and make decisions in a risky environment. Research has been conducted to develop methods to measure risk, analyze risky decisions, and evaluate risk management strategies.

The purpose of this article is to present comments from Cooperative Extension agricultural economists about how risk management programs have been developed and conducted, how the program delivery techniques have changed, and how essential research results are obtained and used. To obtain information about extension risk programs, twelve extension economists were interviewed. Interviewees were Cooperative Extension economists who have developed and delivered educational programs to teach producers how to make production, marketing, and financial decisions in a risky environment. Seven extension economists had responsibilities in production management, three were classified as marketing specialists, and two were management and finance specialists. One economist interviewed was responsible for all three areas. All twelve economists' major emphasis was with traditional (beef, grain crops, and dairy) commodities.

The authors' goals included determining how risk was taught early in the interviewees' careers, what changes were made, and why the changes were made. Another area of

questioning related to the value of research in the development and delivery of risk programs for producers.

Qualitative rather than quantitative research methods were used in this project. Qualitative research focuses on the perception and experience of the interviewees (Locke, Spirduso, and Silverman). In qualitative research, identifying beliefs about what is real and how we come to know things is what is important. The working assumption is that people learn from their experiences and create their own reality. Extension economists who were experienced in the development and implementation of risk programs were interviewed.

The objectives of the research project were explained to each interviewee over the telephone. Questions included "When they first started teaching risk, what was included in their risk programs, what research results were used, and where the research results were obtained?" Questions were asked to determine if their programs had changed, why changes were made, the importance of research, and how professional journals supported the development and delivery of their programs.

The final question involved asking the interviewee who should be included in the interview process. Through this method, extension economists, representing a wide range of experiences from across the United States, were interviewed.

Interview Results

The following is a presentation of information obtained from the extension economist interviews. There were many common beliefs, approaches, and experiences among the economists.

Sources of Program Material

Research is necessary to learn about the decision environment and to generate supporting material for educational programs. To evaluate risk, most extension economists use mean/standard deviation or mean/absolute deviation with concentration on values below the mean. Other research methods used to analyze risk are the mean, maximum, and minimum values (triangular distribution), partial and enterprise budgets with parametric programming and sensitivity analysis, charts and figures, identifying distributions to calculate objective probabilities of outcomes, and Monte Carlo models. Simulation models are also used.

Economists claimed that, early in their careers, they knew less about risk than did the producers they were teaching. Several extension economists indicated that they may have learned more from conducting research than their clientele learned from the results. Conducting research and extension programs facilitated identification and delivery of useful information to producers.

When models and/or statistical analyses are included in presentations, the general consensus is that producers listen patiently but only care about the results. Producers mostly want material that they can use to improve their decision making. Few cared how the numbers were generated. Usefulness of the material in the decision process, logical presentation of the material, and the level of confidence in the economist were the three most important aspects of extension risk management programs.

Much of the material taught in extension programs comes from successful producers. Extension economists observe successful producers, conduct research to determine if the strategies, plans, and actions used by these producers are sound, and then teach other

producers what they have learned. This type of educational program is highly successful because other producers normally have observed the actions in practice, the economist is confident that the actions are sound, and the material is taught with conviction.

Factors Influencing Program Content

Experience is the biggest factor which determines what and how extension economists teach risk. The more experience, the less risk theory and model explanation is included in presentations. Agricultural economists finish their graduate programs with the desire and ability to use complex mathematical models. Most agricultural economists completing Ph.D. programs have a good understanding of economic theory. They have learned how to analyze risk and how to transfer risk. New extension economists may not understand that most producers do not care about economic theory, that few producers have the time or patience to learn theory, and that pure theory rarely fits the multitude of real world situations. One extension economist said, "As a new Ph.D., I included more risk theory in my presentations. As I developed an understanding of risk and my clientele, less theory was directly included in the presentations."

Other factors which influence extension programs include material taught in graduate courses and the influence, availability, and experience of senior extension economists in teaching risk to producers. Each extension economist was asked how risk was taught or incorporated in their teaching process. The most important point made was that the material presented to agricultural producers must be simple and directly applicable to the decision process. Producers tend to ask, "How can I use this information to make money?" One economist referred to Bruce Bullock's S.I.P. principle—Simplicity Is Powerful. Bullock is quoted as saying, "If you can take a complex problem and organize it into simple, explainable parts, then you have something powerful."

Changing Program Content

Extension economists indicated that methods used to teach risk had changed. Most began by conducting research and then presenting the research methods and results. They received little producer response from the methods portion of the presentation. Producers would request additional information about implementing the research results into the decision process.

Teaching methods changed because of the following: (a) with experience, economists understand the clientele better and how decisions are made in a risky environment; (b) simple ways to include risk into extension programs were developed; (c) producers now know more about risk and have a better understanding about probabilities and variability; and (d) the agricultural environment has changed with better access to information. The extension economists indicated that the most important things to remember are to keep things simple, get directly to the point, and give the clientele something they can use now.

Marketing economists gave four reasons for limiting the amount of risk theory or model explanations included in their presentations. The first reason was that "risk aspects" were not popular with producers. Farmers are involved in "high speed farming" and they have access to more information than they can manage. Economists tend to expect them to be specialists in production, finance, marketing, and management. "Most producers feel that they have neither the time nor the desire to learn about risk models." These economists

agreed with Drucker: producers want to know what alternatives are available and how the alternatives will help them.

One economist talked about the "hassle factor." The hassle factor relates to the amount of time and effort required to make a decision relative to the amount of risk reduction. For example, to use futures contracts or options contracts, a producer must spend time learning, experimenting, studying, and using contracts. Unless the operation is large, the risk reduction may be relatively small compared to the amount of effort involved.

The second reason for limiting risk presentations was the inaccuracy of price forecasts and confidence intervals associated with price forecasts. If producers are given a point estimate and the associated confidence interval, they simply say, "I can guess prices that close, so why should I listen to this extension economist?"

The third reason is that risk is complex to teach and explain. Risk and decision making may be taught and explained, but learning takes time that most decision makers allocate to other activities. Producers often feel that they understand risk and would rather spend their time learning about new production methods or technology.

The last reason is that when time is taken to teach and explain risk to producers, they often respond with, "So what? What can I do about risk without reducing profit?" The answer is most often, "Not Much!" Even though most extension economists realize that many producers do not want to spend a lot of time learning about ways to measure risk, how to make decisions in a risky environment and how to measure risk are still taught. Sometimes risk is taught directly, using organized meetings and workshops. Other times risk is taught by camouflaging it with other topics. Programs are developed that teach producers how to think about and analyze risk. Producers may then apply risk evaluation techniques to a host of situations.

Teaching Probabilities

Odds are an important component in teaching risk management. A popular method used to teach probability is the "Risk Ratings" (Ikerd and Anderson). This method uses the mean and one standard deviation as a way to estimate the amount of risk and compare the probability of outcomes from different actions. The distribution of two six-sided die is used to show how the probability of a number between two and twelve may be used in this decision process. The risk-rating method is simple and relatively easy to apply to marketing, production, and financial decisions.

Using a modification of the risk-rating approach, extension economists at the University of Georgia developed a whole farm model that requires producers to provide expected, minimum, and maximum values (Barber, McKissick, and McIntosh). The model generates seven values in the output plus the probability of specific outcomes. The seven values generated are the mean, plus and minus one-half standard deviation, plus and minus one standard deviation, and plus and minus two standard deviations. These numbers are used to calculate the probabilities of producer specified values. When used by producers, the probabilities of specific levels of income, prices, or yields are the values of most interest. They have found that producers want simple programs that provide simple methods that may be used to make profitable decisions. Nearly every extension economist said that producers demanded point estimates. Additional information was provided, but only after the point estimate (expected value or mean) was presented.

When presenting price or income outlook, most extension economists present point estimates and then talk about the "what ifs." These what ifs include how environmental

stimuli will change the point forecast, or what could cause the forecast to be wrong. Based on the point forecast, the what ifs, and the producer's goals, plans may be developed to improve the odds of receiving an acceptable price or generating an acceptable income. Specifying the odds often involved discussing past yields and prices and the variability of yields and prices (mean/variance or mean/absolute deviations). Most extension economists use statistical analysis to determine the mean and variance of historical prices, yields, and income. After discussing the point estimates, variability is then presented.

University of Missouri Cooperative Extension Service economists concentrate on determining and teaching risk actions that have little or no cost over time. For example in the early 1990s, the multiple peril crop insurance payout was often greater than the premium, and for hog producers in a deficit corn area, feed costs often increased throughout the marketing year more than the costs incurred when forward contracting feed needs. Extension economists serve the clientele by teaching risk management actions that have little or no cost over time. These actions and extension programs support the argument that many producers want to know specific strategies and the odds of success, rather than details on why a strategy should be successful.

Producers' Failure to Use Tools

When discussing marketing risk, economists often lament producers' failure to use futures or option contracts. Apparently most producers realize that using futures and option contracts may lower the expected price received, and that over the long run, income may be higher without using futures and/or option contracts.

Another observation by extension economists is that most producers manage risk by increasing or maintaining a high level of equity. High equity does not lower the risk of a loss but lowers the amount of risk exposure. Losses due to yield and price variations are expected, do not threaten the financial security of the business, and are accepted as part of the farming operation. Thus, producers tend to concentrate on management practices which improve production efficiency, reduce costs, and increase returns and equity, rather than on practices which reduce price risk.

Clientele

Research and extension programs must meet the needs of a broad audience. Each audience normally has a wide range of ages, financial positions, and personal objectives. Each person has a different set of factors influencing his/her objectives and his/her decision process.

These differences require defining, viewing, and managing risk differently. One producer may accept variability, and the other avoid it. For example, the manager's goal for a corporate hog operation is most likely to generate an acceptable level of return to investment every year. The manager may not want a banner year or a meager year. Generating a high return raises the risk that the "home office" will demand the high return every year.

The manager of a privately owned hog farm may want the highest average return over years. This manager is willing to accept the risk of low, even negative, returns in order to obtain the high returns that invariably happen. Both managers will be influenced by the availability of financial support in lean years and their respective ability to take risk. Both firm structure and financial position influence objectives and how risk is best managed. Some methods of risk management are more feasible for some farms than for others.

From a marketing viewpoint, most producers view risk as the odds of low prices. Yet, some producers perceive risk as not having the opportunity to sell at the highest price or not

having the opportunity to generate the large income. These views involve the psychological profile (utility) of the individuals. Psychological profiles of producers are probably the least understood aspect of teaching risk and decision making. Most experienced economists have a "gut feeling" about different psychological profiles and how to deal with them. But, means to identify and approach the psychological profile of producers are still uncertain.

The point is that research should be conducted and risk programs developed with knowledge that individual producers vary in financial position, production history, marketing ability, management ability, psychological profile, and objectives. With any audience, the odds of having a diverse group is high.

Extension Economist's View of Published Research

Most extension economists are frustrated with research published in the professional journals. They contend that there are few good research tools available. For example, most of the research methods used depend on the "law of large numbers." There are few agricultural problems for which there is anything near a large data set. Reliable yield data, other than county averages for individual crops, are difficult to obtain and have limited use at the farm level. Most agricultural economists stipulate that there are large price data sets. There are about 262 price quotes per year. But in reality, most farmers make one to five sell decisions per commodity per year. At one sell decision per year, a farmer may make forty sell decisions per commodity in a lifetime.

The consensus of the extension economists interviewed is that most researchers conduct research publishable in professional journals, but the articles have little relevance to real world applications. These views may be harsh and in some cases unfounded. But, even some researchers agree that most research applicable to extension programs is not publishable in the professional journals and that, for promotion and tenure, researchers and some extension economists must publish professional journal articles. Even though applications are accepted for publication, professional journal articles tend to emphasize methods and modeling approaches.

From the interviews, it is clear that research is an integral part of the development and delivery of extension programs. Except for one university, a good working relationship with the research faculty was reported. Some of the economists have both extension and research appointments.

Research Contributions Narrowing the Theory/Practice Gap

Patrick indicates that researchers and producers view decision making quite differently. Researchers often view decision making as an act and develop quantitative methods to improve selection of an alternative. Producers are more likely to view decision making as a learning process. As producers learn, they reevaluate until it is clear that one alternative tends to dominate the others and then a decision is made. Other research indicates that the information producers require for risk management focuses on defining expected outcomes. There is little disagreement that those in extension and research have significant roles in providing timely information on alternative actions and possible outcomes. Extension economists have established their role with producers, while those in research are much less likely to work directly with producers.

An early interpretative review of empirical studies was developed by Walker and Nelson. Much risk research has focused on developments in theory and methods of analysis.

Anderson, Dillon, and Hardaker led the profession in the use of probability. Eliciting individual utility functions to predict risk preferences was of early interest, although the functions' validity was questioned (Young et al.). Development and use of risk efficiency criteria, especially expected-value–variance (EV) analysis, expanded empirical analysis on risk. Stochastic dominance (Meyer) and stochastic dominance with respect to a function (King and Robison) were used to rank risky outcomes in a variety of research applications. Developments to bring risk into mathematical programming models, including variations like MOTAD which would approximate quadratic programming solutions (Hazell) and Target MOTAD which produce solutions consistent with stochastic dominance (Tauer), were significant for theory and applications. These and other programming formulations and applications are reviewed by Boisvert and McCarl. The development of models and a number of applications were published primarily in journals.

Researchers have focused on multiple sources of risk in agriculture despite lack of data on stochastic variables. Farm surveys also reveal multiple sources of risk, with price and output risk being the most important (Musser). Theoretical analysis has focused on limited sources of risk to produce tractable results, but Musser argues that the tension between problems and theory has not been resolved. Patrick, who indicates that attention must focus on the important stochastic variables, goes further in stating that “the gap between the theory and practice of decision making under risk appears even wider than it was in the mid-1970s” (p.10).

The literature contains theory, research methods, and results that are useful to and are used by extension economists. Recent articles by Buschena and Zilberman and Musser present a review of the literature relating to risk research results and measurement techniques that are included in extension programs. An earlier chapter by Walker, Nelson, and Olson summarizes educational programs for teaching decision making under risky conditions in extension and classroom settings.

Conclusions

Extension economists' major objective is to take complex situations, convert them into simple, explainable subjects, and then teach decision makers how to reach their goals. Achievement of these objectives requires sound, useable, and understandable research results, the ability to communicate, and an understanding of the audience's desires and needs.

Producers want to learn. They want information that will make their decisions simpler. Producers have a limit to the amount of information they can use efficiently. In most “family” operations, decisions are made by one person. This person is expected to be a specialist in making economic management decisions, in addition to all agronomic, soils, engineering, and other decisions. In today's agricultural environment, information requirements and complex decisions can be overwhelming. Thus, producers want simple, easy to use, decision rules that serve as a foundation upon which to build.

Producers want point estimates. Point estimates are used in extension programs. Then additional information is supplied that expands the producer's knowledge base to the next level. Extension economists who have recognized this environment supply producers with this type of information.

Extension economists sometimes use successful producers' strategies as guides for research and program development. Once the economist is convinced that a strategy is sound, it is used to teach or, at least, to create the teachable moment. The number one criterion is that the audience must believe they are receiving something useful.

Another strategy used by extension economists is to concentrate on teaching decisions that have a high probability of profit. Examples include crop insurance (only in some areas) that, in the past, had a payout which was often higher than the premium and forward contracting feed requirements in deficit production areas. Producers often demand specific strategies and want the odds of success, rather than details on why a strategy should be successful.

Because most producers understand risk, and many use financial strategies to manage risk, an important product of risk research has been educating researchers and extension economists. Extension economists often complain about research published in professional journals. Yet, most extension economists have a good working relationship with the research faculty, and some publish in the professional journals. Still, the gap between the theory and practice of decision making under risk appears quite wide.

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