

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search http://ageconsearch.umn.edu aesearch@umn.edu

Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.

BOOK REVIEW: Hardaker, J. Brian, Ruud B.M. Huirne, and Jock R. Anderson. *Coping with Risk in Agriculture*. New York: CAB International, 1997, xi + 274 pp., \$40.00 paper. ISBN 085199119X.

Coping with Risk in Agriculture is an ambitious, comprehensive compendium of modern methods and techniques for incorporating and assessing the impact of risk in agricultural decision analysis. The book is aimed at assessing and supplementing the Anderson, Dillon, and Hardaker 1977 classic, Agricultural Decision Analysis (ADA), with recent developments in risk analysis. The focus of the techniques remains on decision making at the individual farm level, and risk assessment and decision analysis for farm managers. The authors are convinced that these methods can be successfully applied to agricultural decisions and should be part of the applied toolbox of researchers and extension economists.

A general approach to risk management is outlined in the first chapter, and this directs the discussion and analysis of the various techniques introduced in subsequent chapters. The authors define risk management as the "systematic application of management policies, procedures, and practices to the tasks of identifying, analyzing, assessing, and monitoring risk."

The technical methods in each chapter are designed to assess any risky decision in terms of two components. The first identifies the nature of the uncertainty and its impact on the outcome of alternative choices; the second elicits the preferences of the decision maker facing the consequences of the alternative choices. A strength of the presentation is that applied agricultural examples are consistently presented throughout the book along with insightful graphical and tabular displays of the information and decision formats. Useful computer packages for each technique are also identified.

The book begins with an outline of decision analysis using decision trees. Methods to

measure and elicit subjective probabilities for a single uncertain outcome are described. A number of useful presentation devices or visual impact methods are employed to assist decision makers in conceptualizing probability judgments. These methods include the probability wheel, trees, and tabular approaches, along with continuous distributions, fractiles, and moments.

The section on subjective elicitation of joint distributions of random variables illustrates how the authors succeed in integrating advanced and frontier material into risk assessment. A detailed example demonstrates a step-by-step application of the assessment of median deviation concordance (MDC) probabilities for alternative pricing scenarios.

The authors are aware of recent work on the psychological pitfalls and judgmental biases that influence decision makers in forming probability judgments. Some of the common judgmental biases include avoidance of uncertainty, representativeness, misconception of chance, anchoring and adjustment, and motivational bias. As Munier and Machina have emphasized, management scientists and psychologists now believe that preferences are not elicited, but are constructed in cooperation between the decision maker and the analyst. In corroboration of this view, the book cites Van Lenthe's elicitation technique as an innovative diagnostic procedure for situations when data are limited. The technique to elicit and assess subjective probabilities based on proper scoring rules is introduced, and an application of the software is demonstrated.

Methods that agricultural decision makers can use to combine abundant data gathered from diverse sources are also discussed. For example, farmers may be faced with results from research agronomy or animal science trials. The authors detail alternative ways of summarizing the information in these trials for on-farm decision making. Helpful guidance is provided on the use of spreadsheet-based stochastic simulation packages (such as @RISK) for these cases.

An overview of the expected utility model and methods to elicit utility functions are topics in chapter 5. This section builds on methods to derive certainty equivalents discussed in ADA. Representation of common utility functions and measures of risk aversion are briefly summarized, but the authors focus on the use of certainty equivalents for decision analysis. A short section comments on estimation of risk aversion from observed behavior and econometric methods to test the implications of risk aversion for decision making. Recognizing that recent research has focused on testing hypotheses about forms of risk aversion, the specific challenge for the authors' research agenda is to link these findings to implications for farmer decision making and policy design.

Decision analysis with unknown preferences is outlined in chapter 7, with concise discussions of methods to approximate utility functions, mean-variance efficiency, and stochastic dominance. The key features of stochastic dominance with respect to a function and convex stochastic dominance are highlighted. The authors emphatically assert that these methods, and the software to implement the analysis, can be fruitfully applied and interpreted on farm decision problems—and should not be confined solely to academic journals.

The integrated and applied nature of the book's presentation is demonstrated in the extended marketing example which integrates probabilities and utility analysis in a decision model in chapter 6. A decision tree and the "averaging out and folding back" method are detailed using two examples, with solutions and payoff tables presented in spreadsheet form. This presentation links the decision technique with familiar and readily available software, encouraging the user to participate by making modifications to the base case. Formats for the payoff table representation and tips for efficiently and concisely presenting the decision tree assist in building a useful analysis. A discussion on stochastic budgeting and the use of spreadsheets to integrate probability distributions into the budgeting process is included.

Whole-farm programming models are addressed with brief descriptions of a range of risk programming techniques including quadratic, MOTAD models, direct expected utility maximization, and stochastic programming. Useful outlines of the tableaus and graphical displays assist the reader in gaining insight into the structure of these models. Key concepts underlying dynamic decision analysis for agricultural and farm business managers are introduced with brief summaries of dynamic programming and dynamic simulation techniques.

The National Research Council's recent report on Understanding Risk (Stern and Fineberg) emphasizes that risk characterization is a decision-driven activity designed to promote informed choices and to solve problems. The NRC stresses that success is based on getting the science right and getting the right science. Readers of Coping with Risk in Agriculture who are familiar with these techniques will be well prepared to accomplish both of those goals.

Timothy A. Park The University of Georgia

References

- Anderson, J.R., J.L. Dillon, and J.B. Hardaker. Agricultural Decision Analysis. Ames IA: The Iowa State University Press, 1977.
- Munier, B., and M.J. Machina, eds. Models and Experiments in Risk and Rationality. Norwell MA: Kluwer Academic Publishers, 1994.
- Stern, P.C., and H.V. Fineberg. Understanding Risk: Informing Decisions in a Democratic Society. National Research Council. Washington DC: National Academy Press, 1996.