

AGRICULTURAL ECONOMICS 662

AGRICULTURAL RISK ANALYSIS

COURSE SYLLABUS

Summer 1996

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Course Description:

This course presents a survey of risk analysis methods and their application in agricultural economics research. The first topic covered includes theoretical formulations for individual risk response. Then attention is turned to the development of probability distributions. Third, methods for resolving risky choices in agricultural production, marketing and policy decisions are reviewed. Finally attention is turned to the development of measures of risk preference.

This course is intended to be much more literature and student-effort based than most courses. Reading of required material and classroom discussion are required, with an attempt to reduce reliance on the lecture format. Required readings are marked with an asterisk.

GRADING

Midterm and final exams will be given. The midterm will count for 40% of the grade, the final for 40%. Homework assignments and class participation will comprise 20% of the grade.

Course Outline, Readings and List of Resource Materials:

Section 1 -- Theoretical Foundations of Risk Analysis

- * Bernoulli, Daniel. "Exposition of a New Theory on the Measurement of Risk." *Econometrica* 22(1954):23-36.
- * Friedman, M. and L. Savage, "The Utility Analysis of Choices Involving Risk." *Journal of Political Economy* 65(1948):279-304.
- * Pratt, J. "Risk Aversion in the Small and in the Large." *Econometrica* 32(1964):122-36.
- * Rothschild, M. and J. Stiglitz. "Increasing Risk I: A Definition". *J. Economic Theory* 2 (1970):225-43.
- * Anderson, J.R., J.R. Dillon and J.B. Hardaker. *Agricultural Decision Analysis*. Ames, Iowa:Iowa State University Press, 1976.

Section 2 -- A Firm's Optimal Choices Under Price and Output Uncertainty

- * Sandmo, A. "On the Theory of the Competitive Firm Under Price Uncertainty." *American Economic Review* 61(1971):65-73.
- * Batra, R.N. and A. Ullah. "Competitive Firm and the Theory of Input Demand Under Price Uncertainty." *J. Political Economy* 82 (1974):537-48.
- * Hartman, R. "Competitive Firm and the Theory of Input Demand Under Price Uncertainty: Comment." *J. Political Economy* 83(1975): 1289-90.
- * MacMinn, R.D. and A.G. Holtmann. "Technological Uncertainty and the Theory of the Firm." *Southern Economic Journal* 50(1983):120-136.

Section 3 -- Applications of Firm's Optimal Choice

- * Ahsan, S.M., A. Ali and N. Kurian. "Toward a Theory of Agricultural Insurance." *Amer. J. Agricultural Economics* 64(1982) : 520-529
- Nelson, C.H. and E.T. Lockman. "Further Toward a Theory of Agricultural Insurance." *Amer. J. Agricultural Economics* 69(1987): 523-31
- * Horowitz, J.K. and E. Lichtenberg. "Insurance, Moral Hazard, and Chemical Use in Agriculture." *Amer. J. Agricultural Economics* 75(1993): 926-35.

- * Kreps, D.M. A Course in Microeconomic Theory. Princeton University Press, 1990. Chapter 16.
- * Newberry, D.M.G. "Risk Sharing, Sharecropping, and Uncertain Labor Markets." *Rev. Econ. Study* 44-3(1977):585-94.
- * Stiglitz, J.E. "Incentives and Risk Sharing in Sharecropping" *Rev. Econ. Study* 41-2(1974):219-55
- * Shavell, S. "Risk Sharing and Incentives in the Principal and Agent Relationships." *Bell J. Econ.* 10-1(1979):55-73.

Section 4 -- Probability Distribution Description

Topic One: Types of Distributions

Conditional vs Unconditional
 Full Distribution vs Moment Based
 Conditional on Discrete Events or a Continuous Level of a Decision Variable
 Known, Unknown Distribution Form
 Discrete, Continuous

Topic Two Formation of Distributions

A. Objective, Unconditional Distributions

- * Young, Douglas L. "Evaluating Procedures for Computing Objective Risk from Historical Time Series." *Risk Analysis in Agriculture: Research and Educational Developments, Proceedings of a Seminar Sponsored by Western Regional Research Project W-149. "An Economic Evaluation of Managing Market Risks in Agriculture"*, Tucson, Arizona, June 1980:1-21.

1) Historical, Unwhitened

- * Zacharias, T.P., M.D. Lange, W.D. Gleason, and H.D. Traylor. "A Producer-Level Cross-Hedge for Rough Rice Using Wheat Futures." *Southern Journal of Agricultural Economics*. 19,2(December 1987):75-82.
- * Chen, J.T. "A Linear Alternative to Quadratic and Semivariance Programming for Farm Planning Under Certainty: Comment." *American Journal of Agricultural Economics*. 53(1971):662-664.

2) Historical, Whitened

- * Brink, L. and B.A. McCarl. "The Tradeoff Between Expected Return and Risk Among Cornbelt Farmers." American Journal of Agricultural Economics. 60,2(1978):259-263.
- * Lambert, D.K. and Bruce A. McCarl. "Sequential Modeling of White Wheat Marketing Strategies." North Central Journal of Agricultural Economics. 11(1989):105-115.
- * Mjelde, J.W., D.P. Anderson, K. Coble, B. Mouflih, j. Outlaw, J.W. Richardson, J. Stokes and V. Sundarapather. "Tutorial on Density Function Estimation and Use." Faculty Paper, FP 94-2, Department of Agricultural Economics, Texas A&M University, College Station, TX, October 1993.

B. Objective, Conditional Distributions

- Just, R.E. and R.D. Pope. "Production Function Estimation and Related Risk Considerations." American Journal of Agricultural Economics. 61(1979):276-284.
- * Buccola, S. and B.A. McCarl. "Small-Sample Evaluation of Mean-Variance Production Function Estimators." American Journal of Agricultural Economics. 68(1986):732-738.
 - * McCarl, B.A. and R.B. Rettig. "Influence of Hatchery Smolt Release on Adult Salmon Production and Its Variability." Canadian Journal of Fisheries and Aquatic Sciences. 40,11(1983):1880-1886.
 - * Taylor, C.R. "A Flexible Method for Empirically Estimating Probability Functions." Western Journal of Agricultural Economics. 9(1984):66-76.
- Nelson, C.H. and P.V. Preckel. "The Conditional Beta Distribution as a Stochastic Production Function." American Journal of Agricultural Economics. 71,2(1989):370-378.
- Coble, K.H. "An Examination of the Existence and Consequences of Asymmetric Information in Multiple Peril Crop Insurance Programs." Ph.D. Dissertation, Texas A&M University, August 1993.

C. Subjective

- * Spetzler, C.S. and Carl-Axel Stael von Holstein. "Probability Encoding in

- Decision Analysis." Management Science. 22(1975):340-358.
- * Winkler, R.C. and A.H. Murphy. "Good Probability Assessors." Journal of Applied Meteorology. 7(1968):751-58.
 - * Grisley, W. and E.D. Kellogg. "Farmer's Subjective Probabilities in Northern Thailand: An Elicitation Analysis." American Journal of Agricultural Economics 65(1983):74-82.
- Norris, P.E. and R.A. Kramer. "The Elicitation of Subjective Probabilities with Applications in Agricultural Economics." Review of Marketing and Agricultural Economics. 58(1990):127-147.

D. Simulated

- * Dillon, C. R., J. W. Mjelde, and B. A. McCarl. "Biophysical Simulation in Support of Crop Production Decisions: A Case Study in the Blacklands Region of Texas." Southern Journal of Agricultural Economics. 25(1989):175-186.
- * Leatham, David J., Bruce A. McCarl, and James W. Richardson. "Implications of Crop Insurance for Farmers and Lenders." Southern Journal of Agricultural Economics. 19(December 1987):113-120.

Section 5 -- Resolving Decisions Among Risky Alternatives

A. Decision Theory

- * Anderson, J.R., J.L. Dillon and B. Hardaker. Agricultural Decision Analysis. Chapters 1 and 5.
 - * Baquet, A.E., A.N. Halter and F.S. Conklin. "The Value of Frost Forecasting: A Bayesian Approach." American Journal of Agricultural Economics. 58(1976):511-520.
- Bullock, J.B. and S.H. Logan. "An Application of Statistical Decision Theory to Cattle Feedlot Marketing." American Journal of Agricultural Economics. 52(1970):234-241.

B. Mathematical Programming

- * Apland, Jeffrey, Bruce A. McCarl, and William L. Miller. "Risk and the Demand for Supplemental Irrigation: A Case Study in the Corn Belt." American Journal of Agricultural Economics. 62,1(February 1980):142-145.

- * Baker, Timothy G. and Bruce A. McCarl. "Representing Farm Resource Availability Over Time in Linear Programs: A Case Study." North Central Journal of Agricultural Economics. 4,1(January 1982):59-68.

Brink, Lars and Bruce A. McCarl. "The Tradeoff Between Expected Return and Risk Among Cornbelt Farmers." American Journal of Agricultural Economics. 60,2(May 1978):259-263.

Hazell, Peter B.R., Roger D. Norton, Malathi Parthasarathy, and Carlos Pomareda. "The Importance of Risk in Agricultural Planning Models." *The Book of CHAC Programming Studies for Mexican Agriculture*. A World Bank Research Publication, 1983.

Lin, William, G.W. Dean, and C.V. Moore. "An Empirical Test of Utility vs. Profit Maximization in Agricultural Production." American Journal of Agricultural Economics. (August 1974):497-508.

- * McCarl, B.A. "Chapter XVII - Risk Modeling." 641 Class Notes.

Meyer, Jack. "Two Moment Decision Models and Expected Utility Maximization: Some Implications for Applied Research." *Proceedings of an S-180 Seminar on "An Economic Analysis of Risk Management Strategies for Agricultural Production Firms."* Savannah, Georgia, March 20-23, 1988, pp. 170-83.

C. Stochastic Efficiency Criteria and Analysis

- * Anderson, Jock R. "Risk Efficiency in the Interpretation of Agricultural Production Research." Review of Marketing and Agricultural Economics. 1974.
- * Cochran, Mark J. "Stochastic Dominance: The State of the Art in Agricultural Economics." *Proceedings of an S-180 Seminar on "An Economic Analysis of Risk Management Strategies for Agricultural Production Firms."* Tampa, Florida, March 23-30, 1986, pp.116-43.

Danok, Abdulla B., Bruce A. McCarl and T. Kelley White. "Machinery Selection Modeling: Incorporation of Weather Variability." American Journal of Agricultural Economics. 62,4(November 1980):700-708.

Klemme, Richard M. "A Stochastic Dominance Comparison of Reduced Tillage Systems in Corn and Soybean Production Under Risk." American Journal of Agricultural Economics. 67,3(1985):550-557.

- * McCarl, B.A., Thomas O. Knight, James R. Wilson, and James B. Hastie. "Stochastic Dominance over Potential Portfolios: Caution Regarding Covariance." American Journal of Agricultural Economics. 69,4(November 1987):804-812.

Pope, Rulon D. and Rod F. Ziemer. "Stochastic Efficiency, Normality, and Sampling Errors in Agricultural Risk Analysis." American Journal of Agricultural Economics. 66,1(February 1984):31-40.

Meyer, Jack. "Choice Among Distributions." Journal of Economic Theory. 14(1977):326-336.

D. Breakeven Stochastic Efficiency Criteria and Analysis

- * McCarl, B.A. "Generalized Stochastic Dominance: An Empirical Examination." Southern Journal of Agricultural Economics. 22,2(December 1990):49-55.
- * McCarl, B.A. "Preference Among Risky Prospects Under Constant Risk Aversion." Southern Journal of Agricultural Economics. 20,2(December 1988):25-33.

Section 6 -- Estimation of Risk Preferences

A. Interview Based Measurement of Risk Preferences

- * Anderson, J.R., J.L. Dillon and B. Hardaker. Agricultural Decision Analysis. Chapter 4, pp. 65-76.
- * King, Robert P. and Lindon J. Robison. "An Interval Approach to Measuring Decision Maker Preferences." American Journal of Agricultural Economics. 63,3(August 1981):510-520.

B. Revealed Preference Measurement (Required Readings to be Announced)

Antle, John M. "Econometric Estimation of Producers' Risk Attitudes." American Journal of Agricultural Economics. 69(1987):509-522.

Babcock, B.A., J.A. Chalfant, and R.N. Collender. "Simultaneous Input and Land Allocation in Agricultural Production Under Uncertainty." Western Journal of Agricultural Economics. 12(1987):207-15.

Fu, T.T., S.M. Fletcher, and J.E. Epperson. "Acreage Planting Decision Analysis of South Carolina Tomatoes: Nerlovian Versus Just Risk Model." Southern Journal of Agricultural Economics. 18,2(December 1986):65-71.

- * Just, Richard E. "An Investigation of the Importance of Risk in Farmers' Decisions." American Journal of Agricultural Economics. 56(1974):14-25.
- * Lins, D., S. Gabriel, and C. Moore. "An Analysis of the Risk Aversion of Farm Operators: An Asset Portfolio Approach." Western Journal of Agricultural Economics. 6(1981):15-29.
- * Love, H.A. and S.T. Buccola. "Joint Risk Preference-Technology Estimation with a Primal System." American Journal of Agricultural Economics. 73,3(1991):765-774.

Pope, Rulon D. "Empirical Estimation and Use of Risk Preferences: An Appraisal of Estimation Methods That Use Actual Economic Decisions." American Journal of Agricultural Economics. 64(1982):376-383.

Ryan, Timothy J. "Supply Response to Risk: The Case of U.S. Pinto Beans." Western Journal of Agricultural Economics. 2(1977):35-43.

- * Saha, Atanu, C. Richard Shumway and Hovav Talpaz. "Jointly Estimating Risk Preference and Technology." American Journal of Agricultural Economics. 76(1994):

Weins, T.B. "Peasant Risk Aversion and Allocative Behavior: A Quadratic Programming Experiment." American Journal of Agricultural Economics. 58(1976):629-635.

Brink, L.G. and B.A. McCarl. "The Tradeoff Between Expected Return and Risk Among Cornbelt Farmers." American Journal of Agricultural Economics. 60,2(1978):259-263.

C. Size and Interpretation of Risk Preferences

McCarl, B.A. and D.A. Bessler. "Estimating An Upper Bound on the Pratt Risk Aversion Coefficient When the Utility Function is Unknown." Australian Journal of Agricultural Economics. 33,1(1989):56-63.