

Revised: Aug. 27, 2007 - Subject to minor updates during the term.

AEC 855: Agricultural Production Economics Syllabus, Fall 2007

<http://www.msu.edu/course/aec/855/aec855.htm>

Scott Swinton and Roy Black, Instructors

Catalog description: Analysis of agricultural production economic models, using econometrics, mathematical programming, and simulation. Introduction to the systems science perspective. Techniques for analysis of risk, environmental value, technological change, and technology adoption.

Prerequisites: EC 801, EC 805, and either AEC 835 or EC 820B or permission of instructor.

Meeting times: Fall term, Tuesday and Thursday 1:00 - 2:20 PM (48 Agriculture Hall.)

Prof. Scott M. Swinton

304 Agriculture Hall

Phone: 353-7218

swintons@msu.edu

Office hours by appointment
and 3:00 - 4:00 pm Tuesdays.

Prof. J. Roy Black

305 Agriculture Hall

Phone: 353-9649

blackj@msu.edu

Office hours by appointment.

Recommended preparation:

EC 801 - Mathematical Applications in Economics (or equivalent)

EC 805 - Microeconomic Analysis (or equivalent)

EC 820B or AEC 835 or equivalent applied econometrics course

(AEC 851 - Agribusiness Operations Management, may also be helpful.)

Objectives for the course

1. Help students link analytical applications with production economics research questions.
 2. Provide experience in the economic analysis of production data.
 3. Encourage direct student participation in classroom teaching and learning.
-

Desired outcomes of the course:

1. Given a problem in agricultural production economics, students will be able to identify an appropriate theoretical framework, a suitable analytical method, and undertake an informed empirical analysis.

2. Students will master the key concepts of production economics, including input-output models, input-input models, output-output models, cost functions, input demand and output supply.

3. Students will have a good general understanding of agricultural production functions, cost and profit functions, math programming models, and non-optimizing simulation models.

Course grading:

Data analysis assignments (4) 30%
Class discussion and preparation 10%
Term project 30%
Final exam 30%

Recommended texts:

Debertin, David L. Agricultural Production Economics. 2nd edition, privately published, 1992 (online version <http://www.uky.edu/~deberti/prod/AgprodCD2007/> requires WordPerfect for math fonts to view correctly).

Beattie, Bruce and C. Robert Taylor. The Economics of Production. New York: Wiley, 1985. (Reprinted by Krieger, Malabar, FL, 1993.)

Baum, Christopher F. An Introduction to Modern Econometrics Using Stata.

In the syllabus,

SMS = taught by Dr. Swinton;
JRB = taught by Dr. Black.

Where possible, readings or web links are available on the course ANGEL website. In the readings listed below,

* = Required reading
(J) = accessible online via JSTOR (<http://www.jstor.org/>).

Supplementary readings (<http://www.msu.edu/course/aec/855/sup855.pdf>) offer greater depth in the topic areas addressed in the course.

AEC 855 Course Outline and Reading Assignments

Agricultural Systems & Models (SMS)

Agricultural production systems and production economics (8/28, 8/30)

* Swinton, S.M. and J.R. Black, "[Modeling of Agricultural Systems.](#)" J-Ph. Colin & E. Crawford, eds, *Research on Agricultural Systems: Accomplishments, Perspectives and Issues*, Comack, NY: Nova Science Publishers, 2000. (http://agecon.lib.umn.edu/cgi-bin/pdf_view.pl?paperid=1944)

* Wright, A. "Farming Systems, Models and Simulation." In J.B. Dent and J.R. Anderson, eds., *Systems Analysis in Agricultural Management*, Sydney: Wiley, 1971. Pages 17-33.

* Dalton, G. E. *Managing Agricultural Systems*. London: Applied Science, 1982. Pages 20-30, 77-85.

Weersink, A., S. Jeffrey, and D. J. Pannell. "[Farm-Level Modeling for Bigger Issues.](#)" *Review of Agricultural Economics* 24(Spring/Summer, 2002):123-140.

Discussion (8/30): Two approaches to simulating yield response

* Flinn, J.C. "The Simulation of Crop-Irrigation Systems." In J.B. Dent and J.R. Anderson, eds., *Systems Analysis in Agricultural Management*, Sydney: Wiley, 1971. Pages 123-151.

* Parsch, L. D., M. J. Cochran, K. L. Trice, and H. D. Scott (1991) "Biophysical Simulation of Wheat and Soybean to Assess the Impact of Timeliness on Double-Cropping Economics". In J. Hanks, and J. T. Ritchie, ed., *Modeling Plant and Soil Systems*. Madison, WI: American Society of Agronomy, pp. 511-534.

Zhang, W., and S. M. Swinton. 2006. "A Natural Enemies-Adjusted Economic Threshold for Pest Control." Selected paper, 8th Annual BioEcon Conference, King's College, Cambridge University, Cambridge, UK, August 29-30, 2006.

http://www.msu.edu/user/swintons/ZhangSwintonBioEcon06_revised_06July31.pdf

Review of Production Economics Concepts (SMS)

Output of one product with one input (9/4, 6)

* Debertin, Chaps. 2-3

* Beattie & Taylor, Chap. 1, Chap. 2, pp. 9-16

Recitation (9/6): Introduction to Stata statistical software.

Assignment 1: Production function estimation (due 9/18)

Output of one product with two inputs (9/11)

* Debertin, Chaps. 5-6.

* Beattie & Taylor, Chap. 2, pp. 16-57.

Planning term project (9/11) (due 10/18) <http://www.msu.edu/course/aec/855/Term~Skd.pdf>

Wooldridge, J.M. Introductory Econometrics: A Modern Approach, 3rd ed. Thomson South-Western, 2006. Chap. 19, "Carrying Out an Empirical Project."

Multiple products, joint products, production possibilities frontiers (9/13, 18)

* Debertin, Chaps. 15-16.

Discussion: Alternative approaches to joint product analysis (9/18)

* Traxler, Greg and Derek Byerlee. "A Joint-Product Analysis of the Adoption of Modern Cereal Varieties in Developing Countries." American Journal of Agricultural Economics 75(1993): 981-989. (J)

* Lichtenstein, M. E., and C. A. Montgomery. 2003. "Biodiversity and Timber in the Coast Range of Oregon: Inside the Production Possibility Frontier." Land Economics 79(2003):56-73. (J)

Westra, John V. and Kevin J. Boyle. "An Economic Analysis of Crops Grown in Rotation with Potatoes in Aroostook County, Maine." Maine Agricultural Experiment Station Bulletin 834, 1991.

Cost functions, Links to duality, and Links between marginal analysis and budgets (JRB: 9/20, 25).

* Debertin, Chaps. 4, 19.

* Hayenga, M. "Cost Structures of Pork Slaughter and Processing Firms: Behavioral and Performance Implications." Review of Agricultural Economics 20(Fall/Winter, 1998):574-583. (J)

* Besanko, D., D. Dranove and M. Shanley. "Horizontal Boundaries: Economies of Scope and Scale." Chapter 5 in Economics of Strategy. 3rd ed. New York: Wiley, 2004.

Duality of Profit & Cost Functions (JRB)

Overview of duality (10/2, 4, 5[Fri])

* Coelli, T., D.S. Prasada Rao, and G.E. Battese, eds. *An Introduction to Efficiency and Productivity Analysis*. Boston: Kluwer. Chap. 3.

* Debertin (2nd ed.), Chaps. 24-25.

* Beattie & Taylor, Chap. 6.

Assignment 2 (10/4): Econometric estimation using duality (due 10/23)

Discussion topic: Crop insurance & input demand (JRB 10/5)

* Horowitz, J.K. and E. Lichtenberg. "Insurance, Moral Hazard, and Chemical Use in Agriculture." *American Journal of Agricultural Economics* 75(1993): 926-935. (J)

* Smith, Vincent H. and Barry K. Goodwin. "Crop Insurance, Moral Hazard, and Agricultural Chemical Use." *American Journal of Agricultural Economics*. 78(May 1996): 428-438. (J)

Functional Form & Model Specification (SMS)

Introduction to production function forms (10/9)

* Debertin, Chaps. 10-11, 24.

* Beattie & Taylor, pp. 64-73

* Griffin, Ronald C., John M. Montgomery, and M. Edward Rister. "Selecting Functional Form in Production Function Analysis." *Western Journal of Agricultural Economics* 12(December 1987): 216-227. http://agecon.lib.umn.edu/cgi-bin/pdf_view.pl?paperid=12268&ftype=.pdf

Testing for functional form: Nested vs. non-nested tests in linear & nonlinear models (10/11)

* Greene, William H. *Econometric Analysis*. 5th edition. New York: Prentice Hall, 2003. Pages 93-104 and 152-155 (linear models); 175-180 (nonlinear models).

Discussion: Forms of crop response functions (10/11)

* Ackello-Ogutu, Christopher, Quirino Paris, and William A. Williams. "Testing a von Liebig Crop Response Function against Polynomial Specifications." American Journal of Agricultural Economics 67(1985): 873-880. (J)

* Frank, Michael D., Bruce R. Beattie, and Mary E. Embleton. "A Comparison of Alternative Crop Response Models." American Journal of Agricultural Economics 72(1990): 597-603. (J)

Getting Data Ready for Analysis (JRB)

Prescreening, diagnosing, and treating influential data points (10/16, 18)

*Weisberg, Sanford. Applied Linear Regression. New York: Wiley, 1985. (Chaps. 5-6.)

*Ryan, T.P. Modern Regression Methods. New York: Wiley. Chaps. 2 ("Diagnostics & Remedial Measures") & 11 ("Robust Regression") & pp. 491-493 ("A Strategy for Analyzing Regression Data")

Assignment 3 (10/18): Data preparation and model design (due 11/1)

Constrained Maximization and Linear Programming (LP) (SMS: 10/23, 25)

* Paris, Quirino. An Economic Interpretation of Linear Programming. Ames, IA: Iowa State University Press, 1991. Chapters 1-2 (intro) and 9 (Lagrangean functions).

* Hazell, P. B. R. and R. D. Norton. Mathematical Programming for Economic Analysis in Agriculture. New York: Macmillan, 1986. Chapter 2. (Optional: Model design in Ch. 3, Risk programming in Ch. 5.) URL: <http://www.ifpri.org/pubs/otherpubs/mathprog.htm>

Risk in production models (SMS)

Overview of risk in production models (10/30)

* Hardaker, J.B., R.B.M. Huirne, J.R. Anderson and G. Lien. *Coping with Risk in Agriculture*. 2nd ed. Wallingford, UK: CABI, 2004. Chapter 2.

* Robison, Lindon J. and Peter J. Barry. *The Competitive Firm's Response to Risk*. New York: Macmillan, 1987. Chapter 2 (pp. 11-16).

Stochastic efficiency criteria and dominance analysis (10/30)

* King, R.P. and L.J. Robison. "Risk Efficiency Models." Chapter 6 in P. J. Barry, ed., *Risk Management in Agriculture*. Iowa: Iowa St. Univ. Press, 1984. Pages 68-81.

* Hardaker et al. (2004). Chapter 7.

Assignment 4 (11/1): Risk management (due 11/15).

Risk-weighted utility analysis (11/1)

* Robison, L.J., P.J. Barry, J.B. Kliebenstein, and G.F. Patrick. "Risk Attitudes: Concepts and Measurement Approaches." Chapter 2 in P.J. Barry, ed., *Risk Management in Agriculture*. Iowa: Iowa State University Press, 1984. Pages 11-30.

* Hardaker et al. (2004). Chapter 5.

Empirical risk analysis including stochastic programming (11/6)

* Selley, Roger. "Decision Rules in Risk Analysis." In P.J. Barry, ed., *Risk Management in Agriculture*. Iowa: Iowa State University Press, 1984. Pages 53-67.

* Hardaker, et al. (2004). Chapter 9.

Hazell, P. B. R. 1971. "A Linear Alternative to Quadratic and Semivariance Programming for Farm Planning Under Uncertainty." *American Journal of Agricultural Economics* 53(1971):53-62.

Discussion: Risk in production analysis (11/6)

* Musser, W. N., and G. F. Patrick (2002) "How Much Does Risk Really Matter to Farmers". In R. E. Just, and R. D. Pope, ed., *A Comprehensive Assessment of the Role of Risk in U.S. Agriculture*. Boston: Kluwer, pp. 537-556.

* Hardaker, J. B., J. W. Richardson, G. Lien, and K. D. Schumann. 2004. "Stochastic Efficiency Analysis with Risk Aversion Bounds: A Simplified Approach." *Australian Journal of Agricultural and Resource Economics* 48(2004):253-270.

Production Models in the Study of Environment & Health Effects (SMS)

Overview (11/8, 13)

* Zilberman, David and Michelle Marra. "Agricultural Externalities," Chapter 6 in G.A. Carlson, D. Zilberman, and J.A. Miranowski, eds., *Agricultural and Environmental Resource Economics*, New York: Oxford University Press, 1993. Pages 221-267 (esp. 239-243, 249-262).

Linking biophysical simulation models with economic models

* Benitez, P. C., T. Kuosmanen, R. Olschewski, and G. C. Van Kooten. 2006. "Conservation Payments under Risk: A Stochastic Dominance Approach." *American Journal of Agricultural Economics* 88(February, 2006):1-15.

* Teague, Mark L., Daniel J. Bernardo, and Harry P. Mapp. "Farm-Level Economic Analysis Incorporating Stochastic Environmental Risk Assessment." *American Journal of Agricultural Economics* 77(1995): 8-19. (J)

* Antle, J. M., and S. M. Capalbo. "[Econometric-Process Models for Integrated Assessment of Agricultural Production Systems.](#)" *American Journal of Agricultural Economics* 83(May, 2001):389-401. (J)

Kaiser, H. M., S. J. Riha, D. S. Wilks, D. G. Rossiter, and R. Sampath. "A Farm-Level Analysis of Economic and Agronomic Impacts of Gradual Climate Warming." *American Journal of Agricultural Economics* 75(May, 1993):387-398. (J)

Johnson, Scott L., Richard M. Adams, and Gregory M. Perry. "The On-Farm Costs of Reducing Groundwater Pollution." *American Journal of Agricultural Economics* 73(1991): 1063-1073. (J)

Multiple attribute evaluation of environmental hazards and economic criteria

Hoag, Dana L. and Arthur G. Hornsby. "Coupling Groundwater Contamination with Economic Returns When Applying Farm Pesticides." *Journal of Environmental Quality* 21(Oct.-Dec. 1992): 579-586.

Nofziger, D. L., A. G. Hornsby, and D. L. Hoag. 2002. "Pesticide Economic and Environmental Tradeoffs: PEET." Oklahoma Agricultural Experiment Station. (accessed August 29, 2005). <http://soilphysics.okstate.edu/software/peet/document.html>.

Download PEET software from: <http://soilphysics.okstate.edu/software/peet>.

Technology Adoption (SMS)

Overview (11/15)

* Besley, Timothy and Anne Case. "Modeling Technology Adoption in Developing Countries." *American Economic Review* 83(May 1993): 396-402. (J)

* Nowak, Pete. "Why Farmers Adopt Production Technology." *Journal of Soil and Water Conservation* 47(January-February 1992): 14-16.

* Feder, Gershon, Richard E. Just, and David Zilberman. "Adoption of Agricultural Innovations in Developing Countries: A Survey." *Economic Development and Cultural Change* 33(1985): 255-298. (J)

Discussion topic: Alternative approaches to adoption research (11/20)

* Rahm, Michael R. and Wallace E. Huffman. "The Adoption of Reduced Tillage: The Role of Human Capital and Other Variables." *American Journal of Agricultural Economics*. 66(November 1984): 405-412. (J)

* Byerlee, Derek and Edith Hesse de Polanco. "Farmers' Stepwise Adoption of Technological Packages: Evidence from the Mexican Altiplano." *American Journal of Agricultural Economics*. 68(August 1986): 519-527. (J)

* Fernandez-Cornejo, J., C. Alexander, and R. E. Goodhue. "Dynamic Diffusion with Disadoption: The Case of Crop Biotechnology in the USA." *Agricultural and Resource Economics Review* 31(April, 2002):112-126. http://agecon.lib.umn.edu/cgi-bin/pdf_view.pl?paperid=22090&ftype=.pdf

Technological Change (JRB: 11/27, 29)

* Please read either :

a) Antle, John and Susan Capalbo. *Agricultural Productivity: Measurement and Explanation*. Washington: Resources for the Future, 1988. Chap. 2. (Heavy going but try to work through.)

or

b) Alston, J.M., G.W. Norton, and P.G. Pardey. 1995. *Science Under Scarcity: Principles and Practice of Ag Research Evaluation*. Cornell. Ch. 3. (Covers similar material to Antle and Capalbo; less technical.) Skim Alston, et. al. for references and review of a large number of studies and approaches.

* Ruttan, V.W. and Y. Hayami. "Induced Technical Change in Agriculture." Chap. 9 in Antle & Capalbo.

Synthesis: Matching Methods to Problems (SMS & JRB)

Oral presentations of term paper research (Dec. 4, 6)

**Final examination and term paper final drafts due:
Monday, December 10: 12:45 - 2:45pm. Room 48 Ag Hall.**
