

BUS 922 - ADVANCED REGRESSION

Paul Koch

Office: 118D Summerfield

Phone: 864-7503

Office Hours: T Th 2:30-3:20 and by appointment

The prerequisites for the course are a basic knowledge of calculus, statistics, and linear algebra. For example, a sufficient background would be the equivalent of Math 121 or 124 and Business Statistics courses, 920 and 921.

There are six books which will be useful throughout the sequence. They are:

Greene, *ECONOMETRIC ANALYSIS* (McGraw-Hill)

Judge, et al., *INTRODUCTION TO THE THEORY AND PRACTICE OF ECONOMETRICS*,
2nd Edition (Wiley)

Judge, et al., *THE THEORY AND PRACTICE OF ECONOMETRICS* (Wiley)

Johnston, *ECONOMETRIC METHODS*, 2nd Edition (McGraw-Hill)

Maddala, *ECONOMETRICS*, 2nd Edition (McGraw-Hill)

Schmidt, *ECONOMETRICS*, (Marcel Dekker)

Occasional references will be made to:

Theil, *PRINCIPLES OF ECONOMETRICS* (Wiley)

Kmenta, *ELEMENTS OF ECONOMETRICS* (Macmillan)

Dhrymes, *ECONOMETRICS* (Harper and Row)

Dhrymes, *INTRODUCTORY ECONOMETRICS* (Spring-Verlag)

These books will be made available.

	<u>Course Grading</u>
Take-home exams and computer applications	33%
Midterm	33%
Final	<u>34%</u>
Total:	100%

Class participation is expected. Note that it is the quality and not simply the frequency of participation that is important.

Take-home exams and computer applications will be assigned at various times throughout the term. The exams will typically involve applying the theory discussed in class to solve problems or prove theorems. The computer problems will involve scrutinizing and manipulating data sets that I provide, to investigate certain issues germane to the course material and to gain experience applying the methodologies discussed in class. With each such problem you will be required to perform data analysis. You will write up your results for each computer assignment in the form of a short paper (5 pages, maximum) that you will "submit" to me for review. I encourage all students to share your thoughts on these take-home exams and computer problems. I also expect each student to perform the computer analyses her or himself, and submit his or her own individual papers.

Course Outline

0. Matrix Algebra Review
1. Statistical Review
2. Regression Under Ideal Conditions
3. Non-Ideal Conditions and Related Topics
 - a. Restrictions
 - b. Non-normal Disturbances
 - c. Multicollinearity
 - d. Non-Zero Mean
 - e. Generalized Least Squares
 - f. Autocorrelation
 - g. Heteroskedasticity
 - h. Stochastic Regressors
 - i. Seemingly Unrelated Regressions
4. Simultaneous Equation Models
 - a. Introduction
 - b. Identification
 - c. Single Equation Estimators (ILS, 2SLS, LIML, etc.)
 - d. Systems Estimators (3SLS, FIML, etc.)
 - e. Comparisons of Estimators
 - f. Recursive Models
 - g. Reduced Form Estimation
 - h. Dynamic Models
 - i. Autocorrelation in Simultaneous Equation Models
 - j. Oversize Model Problem
5. Miscellaneous Topics
 - a. Distributed Lags
 - b. Qualitative Variables
 - c. Pooling Cross-Section and Time-Series Data
 - d. Ridge Regression and Stein Rule Estimators
 - e. Non-Linear Models
 - f. Model Choice
 - g. Rational Expectations Models
 - h. Time-Series Models (Box-Jenkins, spectral analysis)
 - i. Bayesian Methods
 - j. Causality Tests and Other Specification Error Tests
 - k. Disequilibrium Models and Switching Regressions
 - l. Random Coefficients
 - m. Unobservable Variables

Reading List

Journal abbreviations in this list are as follows:

ECON = Econometrica; JEC = Journal of Econometrics; IER = International Economic Review;
 JASA = Journal of the American Statistical Association; JRSS = Journal of the Royal Statistical
 Society; AESM = Annals of Economic and Social Measurement; RESTAT = Review of Economics
 and Statistics; RESTUD = Review of Economic Studies.

Topic numbers correspond to those in the course outline.

0. Chiang, Fundamental Methods of Mathematical Economics, Ch. 4-5; Johnston, Ch. 4; Theil, Ch. 1.
2. Schmidt, appendix; Kmenta, Ch. 1-6; Theil, Ch. 2.
3. Schmidt, Ch. 1; Theil, 3.1-3.7; Johnston, Ch. 1-3, 5.1-5.5.
- 3A. Kmenta, 11.2; Judge, Ch. 3; Rothenberg, Efficient Estimation with A Priori Information (Yale Press, 1973); Wallace and Ashar, RESTAT, May 1972, Leamer, JEC, Nov. 1975; Thomas and Schmidt, RESTAT, 1982.
- 3B. Kmenta, Introduction to Ch. 8; Judge, Ch. 7; Maddala, 13.9-13.10; Schmidt, 2.4.
- 3C. Schmidt, 2.3; Johnston, 5.7, 11.1; Judge, Ch. 12; Maddala, 10.1-10.2.
- 3D. Schmidt, 12.2; Maddala, 9.5-9.6; Kmenta, 10.4; Hausman, ECON, Nov. 1978; Thursby, JASA, March 1979.
- 3E. Johnston, 7.1-7.2; Schmidt, 2.5; Theil 6.1; 8.6; Maddala, ECON, Jan. 1971.
- 3F. Judge, Ch. 5; Johnston, Ch. 8; Maddala, 12.5-12.8, Durbin, ECON, May 1970; Maeshiro, IER, Feb. 1979; Balestra, JEC, Dec. 1980; Betancourt and Kelegian, ECON, July, 1981.
- 3G. Judge, Ch. 4; Johnston, 7.3; Maddala, 12.2-12.4, Kmenta, 8.1; Amemiya, JASA, Dec. 1973; White, ECON, May 1980.
- 3H. Schmidt, Ch. 3; Kmenta, 8.3; Maddala, 9.4; 13.1-13.8; Theil, 8.7, 12.2; Johnston, Ch. 9, 10.3; Durbin, ECON, 1970; Hatanaka, JEC, Sept. 1974.
- 3I. Schmidt, 2.6; Judge, Ch. 6; Theil, 7.1-7.3.
- 4A. Theil, 9.1-9.3; Johnston, 12.1; Schmidt, 4.1-4.3.

- 4B. Schmidt, 4.4; Theil, 9.4; 10.2; Johnston, Ch. 12; Fisher, The Identification Problem in Econometrics (McGraw-Hill, 1966); Rothenberg, ECON, May 1971; Bowden, ECON, Nov. 1973; Wegge, Australian Journal of Statistics, 1966.
- 4C. Schmidt, 4.5-4.8; Theil 9.5, 10.3-10.4; Johnston, 13.2-13.4; Kmenta, 13.3.
- 4D. Theil, 10.5-10.7; Schmidt, 5.1-5.3; Johnston, 13.6,; Kmenta, 13.4; Hausman, ECON, July 1975.
- 4E. Johnston, 13.8; Theil, 10.8; Sargan, ECON, May 1976 (and see references therein); Mariano, ECON, July 1972; Mariano and Sawa, JASA, March 1972; Zellner, JEC, Oct. 1978; Maddala, ECON, Sept. 1974; Dhrymes, RESTAT, 1969.
- 4F. Goldberger, 7.10; Kmenta, 13.5; Johnston, 13.1; Theil, 9.6; Lahiri and Schmidt, ECON, Sept. 1978.
- 4G. Schmidt, 5.4; Dhrymes, ECON, Jan. 1973.
- 4H. Kmenta, 13.6; Theil, 9.7; Oberhofer and Kmenta, ECON, Jan. 1973; Schmidt, ECON, March and May 1974; Schmidt, ECON, Jan. 1973.
- 4I. Fair, ECON, 1970; Amemiya, ECON, April 1966; Fair, RESTAT, 1972; Hatanaka, JEC, May 1976; Hatanaka, IER, Oct. 1975; Godfrey, ECON, Sept. 1976; Deistler and Schrader, ECON, Mar. 1979; Harvey and Phillips, ECON, April 1980; Kohn, ECON, Sept. 1979.
- 4J. Brundy and Jorgenson, RESTAT, 1971; Johnston, 13.5; Sargan, IER, Feb. 1975.
- 5A. Maddala, Ch. 16; Judge, Part 6; Kmenta, 11.4; Johnston, 10.1-10.2; Sims, ECON, May 1971.
- 5B. Johnston, 6.1, 11.3; Maddala, 9.2, 9.7; Judge, Ch. 14; Theil, 12.5; Zarembka, Frontiers of Econometrics (Academic Press, 1974), Ch. by McFadden; the whole fall 1976 issue of AESM, especially article by Heckman; Hausman and Wise, ECON, March 1978; Manski and Lehrman, ECON, Nov. 1977; Poirier, JEC, Feb. 1980.
- 5C. Maddala, Ch. 14; Judge, Ch. 8; Maddala, ECON, March 1971; Kmenta, 12.2; Wallace and Hussein, ECON, 1969; Mundlak, ECON, Jan. 1978.
- 5D. Judge, relevant parts of Ch. 3 and 12; Schmidt, pp. 48-54; Judge and Bock, The Statistical Implications of Pre-Test and Stein-Rule Estimators in Econometrics, North Holland, 1978; Vinod, RESTAT, Feb. 1978.
- 5E. Kmenta, 11.3; Maddala, 9.8; Judge, Ch. 17; Edgerton, IER, Feb. 1972; Amemiya, JEC, Nov. 1975; Gallant, JEC, Jan. 1977; Hatanaka, JEC, Dec. 1978; Amemiya, ECON, May 1977.

- 5F. Hocking, Biometrics, 1976; Judge, Ch. 11; Zarembka, Frontiers of Econometrics, Ch. 2; Theil, 12.1; Pesaran, RESTUD, 1974, Koch and Ragan, Economic Inquiry, Jan. 1986.
- 5G. Nelson, IER, Oct. 1975; McCallum, IER, June 1976; Revankar, ECON, Sept. 1980, Wallis, ECON, Jan. 1980; Hoffman and Schmidt, JEC, Feb. 1981.
- 5H. Maddala, 15.8; Box and Jenkins, Time Series Analysis (Holden-Day, 1970); Zellner and Palm, JEC, May 1974; Wallis, ECON, Sept. 1977, Koch and Yang, JASA, June 1986.
- 5I. Maddala, Ch. 18; Theil, 12.9; Zellner, An Introduction to Bayesian Inference in Econometrics (Wiley, 1971).
- 5J. Sims, AER, 1972; Hausman, ECON, Nov. 1978; Geweke, JEC, April 1978; Feige and Pearce, RESTAT, April 1979; Zarembka, Frontiers in Econometrics, Ch. 1; Thursby and Schmidt, JASA, Sept. 1977; Wu, ECON, 1973; Ramsey and Schmidt, JASA, Sept. 1976.
- 5K. Fair and Jaffee, ECON, May 1972; Fair and Kelejian, ECON, Jan. 1974; Amemiya, ECON, July 1974; Maddala and Nelson, ECON, Nov. 1974; Goldfeld and Quandt, JEC, Nov. 1975; Hartley and Mallela, ECON, July 1977; Kiefer, ECON, Mar. 1978; Quandt, IER, June 1978; Ito, ECON, Jan. 1980; Quandt and Ramsey, JASA, Dec. 1978; Kiefer, ECON, July 1979; Farley, Hinich and McGuire, JEC, Aug. 1975; Schmidt, ECON, 1982.
- 5L. Maddala, Ch. 17; Judge, Ch. 9; Zarembka, Frontiers in Econometrics, Ch. 5; Theil, 12.4; Kelejian, ECON, May 1974.
- 5M. Goldberger, ECON, Nov. 1972; Zarembka, Frontiers in Econometrics, Ch. 7; Zellner, IER, 1970; Geraci, JEC, Aug. 1976; Geraci, ECON, July 1976; Hsiao, IER, June 1976; Hsiao, ECON, Mar. 1979.