

MEMORIAL UNIVERSITY OF NEWFOUNDLAND

ECONOMICS 6002 Econometrics

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COURSE OBJECTIVES

The objectives of the course are threefold:

- Exposure to the theory of econometric estimation and inference at a level sufficient to support empirical research appropriate to the M.A. level;
- Provide 'hands-on' exposure to the techniques through replication of classic econometric studies using a general econometrics computer software package;
- Provide experience in designing and implementing your own econometric study.

Thus, the course will feature both theoretical and applied econometrics, and in both aspects an attempt will be made to reinforce textbook knowledge with concrete implementation, through exercises on real data sets. To this end, the econometric modelling package SHAZAM has been site-licensed at MUN, and can be freely installed on any University or home computer owned by a University student. SHAZAM should be able to handle all the problems considered in this course. As a capstone, each student will implement an econometric study of his or her own, and make a 30-minute presentation of this study at the end of the semester.

PREREQUISITES

A familiarity with the general linear model, roughly at the level covered in R. Ramanathan, *Introductory Econometrics with Applications*, or Judge, George G., W.E. Griffiths, R. Carter Hill, Helmut Lütkepohl, and Tsoung-Chao Lee, *Introduction to the Theory and Practice of Econometrics* (known popularly as 'Baby Judge'), is expected. Also, a level of competence in linear algebra and difference equations comparable to that provided by Chiang's *Fundamental Methods of Mathematical Economics* is expected.

TEXTBOOKS

Greene, W.H., *Econometric Analysis*, Sixth Edition. This is basically an encyclopaedia of econometric technique. Treat it as a basic reference, not a textbook.

Berndt, Ernst R., *The Practice of Econometrics*. A handbook of applied econometrics, containing specific examples from the literature. Most of your assigned work will be taken from this textbook.

Kennedy, Peter, *A Guide to Econometrics*. Fifth Edition.

SHAZAM User's Reference Manual version 9.

FURTHER REFERENCES

The two sources I find most consistently useful are:

Judge, George G., W.E. Griffiths, R. Carter Hill, Helmut Lütkepohl, and Tsoung-Chao Lee, *The Theory and Practice of Econometrics*. Known as “Big Judge”, in contrast to “Baby Judge” referred to in the prerequisites section.

Davidson, Russell, and James G. MacKinnon, *Estimation and Inference in Econometrics*.

A good presentation at the introductory level is G.S. Maddala, *Introduction to Econometrics*.

The five-volume *Handbook of Econometrics*, published by North-Holland, is comprehensive but often beyond the masters' level.

METHOD OF EVALUATION

Homework Assignments	30%
Seminar Paper	35%
Final Examination	35%

COURSE PLAN

A. REVIEW OF THE CLASSICAL LINEAR REGRESSION MODEL

1. Review of the General Linear Model and Ordinary Least Squares (1 class)

Objectives:

- Review the properties of the Ordinary Least Squares (OLS) estimator under classical (and quasi-classical) conditions.
- Familiarize yourself with the basic mechanics of running the econometric software package SHAZAM and its operation on a personal computer.
- Run linear regressions and make statistical inferences using SHAZAM.

References:

Greene, chs. 1-4.

Kennedy, chs. 1-3, 11.

“An Introductory Guide to SHAZAM,” <http://shazam.econ.ubc.ca/intro/>,
SHAZAM Terms and Getting Started.

SHAZAM manual, chs. 1-7, 44-45.

2. Statistical Inference (2 classes)

Objectives:

- Review principles of statistical inference and hypothesis-testing in the classical statistical model.

References:

Greene, ch. 5.

Kennedy, ch. 4.

Berndt, ch. 3.

SHAZAM manual, ch. 8.

Assignment #1

3. Model Specification (1 class)

Objectives:

- Test for, and deal with practical difficulties associated with model misspecification, non-linearities, and the like.

References:

- Greene, chs. 6-7.
- Kennedy, chs. 5-7, 14.
- Berndt, ch. 5.
- SHAZAM manual, chs. 14, 36, 40 (pp.434-36).

4. Heteroscedasticity (1 class)

Objectives:

- Examine the effect of residual heteroscedasticity on the properties of the OLS estimator, and how to correct for these effects.
- Testing for the presence of heteroskedasticity.
- Implementing efficient Generalized Least-Squares (GLS) estimation in the presence of heteroskedasticity.

References:

- Greene, ch. 8 (to 8.7).
- Kennedy, ch. 8.1-8.3.
- Berndt, ch. 7.
- SHAZAM Manual, ch. 19, 20, 37.

B. EXTENSIONS OF THE CLASSICAL LINEAR REGRESSION MODEL

5. Panel Data Models (1 class)

Objective:

- Obtain a basic familiarity with estimation methods to be used with panel data.

Reference:

- Greene, ch. 9 (to 9.6).
- Kennedy, ch. 17.
- SHAZAM Manual, ch. 24.
- Hsiao, Cheng, "Why Panel Data?", University of Southern California, Institute of Policy Research, Working Paper 05.33, September 2005. Downloadable at http://www.usc.edu/schools/college/econ/IEPR/Working%20Papers/IEPR_05.33_%5bHsiao%5d.pdf

6. Systems Estimation (1 class)

Objectives:

- Efficiently estimate complete equations systems.
- Impose and test cross-equation constraints on parameter values.
- Examine and estimate flexible functional forms.

References:

Greene, ch. 10 (except 10.3).

Berndt, ch. 9.

SHAZAM Manual, ch. 29.

7. Non-Linear Estimation (2 classes)

Objectives:

- Estimate equations which are non-linear in their parameters.
- Imposing and testing non-linear parameter restrictions.

References:

Greene, ch. 11 (to 11.5).

Kennedy, ch. 6.

SHAZAM Manual, ch. 22, 12.

Assignment #2.

8. Instrumental Variables Estimation (1 class)

Objectives:

- Understanding and implementing Instrumental Variables Estimation
- Testing for exogeneity of the independent variables using the Hausman test.

References:

Greene, ch. 12.

Kennedy, ch. 9.1-9.3.

Berndt, ch. 8.

SHAZAM Manual, chs. 29, 33, 40 (pp. 432-33).

9. Simultaneous Equations Models (1 class)

Objectives:

- Identifying a structural equation.
- Estimating structural equations when variables are simultaneously determined.

- Efficiently estimate complete equations systems.

References:

- Greene, ch. 13.
- Kennedy, ch. 10.
- Berndt, ch. 10.
- SHAZAM Manual, ch. 29.

Assignment #3.

C. (RELATIVELY) ADVANCED ECONOMETRICS

10. Robust and Nonparametric Estimation (1 class)

Objectives:

- An introduction to alternative methods of econometric estimation, including robust and nonparametric estimation.

References:

- Greene, ch. 14.3-14.5.
- Kennedy, ch. 20.
- SHAZAM Manual, chs. 23, 26.

11. Maximum Likelihood Estimation (3 classes)

Objectives:

- A thorough grounding in the principles and practice of Maximum Likelihood Estimation.

References:

- Greene, ch. 16 (up to 16.6).
- Kennedy, ch. 2.9.
- SHAZAM Manual, chs. 21, 22.

12. Autocorrelation (2 classes)

Objectives:

- Examine the effect of residual heteroscedasticity and autocorrelation on the properties of the OLS estimator, and how to correct for these effects.
- Testing for the presence of heteroskedasticity and autocorrelation.
- Implementing efficient Generalized Least-Squares (GLS) estimation in the presence of heteroskedasticity and autocorrelation.

References:

- Greene, ch. 19.
- Kennedy, ch. 8.4.
- SHAZAM Manual, ch. 11.

13. Dynamic (Distributed Lag) Models (1 class)

Objectives:

- Estimation of alternative distributed lag models with and without autocorrelated disturbances.
- Estimation and testing of time-series/autoregressive models.

References:

- Greene, ch. 20.
- Kennedy, section 9.4
- Berndt, chs. 6.
- SHAZAM Manual, ch. 15.

14. Time-Series Models (2 classes)

Objectives:

- Testing for the presence of non-stationary statistical processes and unit roots.
- Implications of unit roots for statistical inference and regression.
- Understanding cointegration and its implications for estimation and statistical inference.
- Testing for the presence of cointegration in time series.
- Estimation of error-correction models.
- Understanding Vector Autoregression (VAR) Models.
- Testing for causality (Granger).

References:

- Greene, chs. 21.1, 21.2, 22.
- Kennedy, ch. 18.
- Juselius & Hendry, "Explaining Cointegration Analysis: Part II," *The Energy Journal*, 22:1, 75-120. (2001). Downloadable through MUN Library.
- SHAZAM Manual, chs. 10, 13.

15. Limited and Discrete Dependent Variable Models (3 classes)

Objectives:

- Examine the effect on OLS estimators when the dependent variable is truncated or

- censored, or limited to discrete values.
- Utilize probit, logit, and Tobit estimators to estimate such equations consistently.

References:

Greene, chs. 23 (except 23.5-23.9), 24.

Kennedy, chs. 15, 16.

Joel L. Horowitz and N.E. Savin, "Binary Response Models: Logits, Probits and Semiparametrics", *Journal of Economic Perspectives* 15:4, 43-56, Fall 2001. Downloadable through MUN Library..

Berndt, ch. 11.

SHAZAM Manual, chs. 25, 28.

16. Econometric Project

Objectives:

- Provide experience in designing and implementing your own econometric study.

References:

Kennedy, ch. 21.

Tomas Dvorak, "An Annotated Sample Paper in Econometrics", *Journal of Economic Education*, 38(1) (Winter 2007), online at http://www.union.edu/PUBLIC/ECODEPT/dvorakt/43/sample_paper.htm

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