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UNIVERSITY OF CALGARY
DEPARTMENT OF ECONOMICS

ECONOMICS 615
ADVANCED ECONOMETRICS I

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1   COURSE INFORMATION (WINTER 2008).

Instructor.	Chris Auld
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	Social Science tower room 436
Homepage.	http://jerry.ss.ucalgary.ca/e615.html
Course Hours.	3 lecture hours per week, plus occasional tutorials
Course location:	SS423, Tuesdays and Thursdays, 4:00
Office hours:	Tuesdays and Thursdays, 1:30-3:00.
Prerequisites.	Two semesters of mathematical statistics or econometrics at the undergraduate level, a course in linear algebra, and a course in multivariate calculus. Or instructor's consent.

2   COURSE DESCRIPTION.

Economics 615 is primarily a course in applied econometrics. That is, it is a course intended to turn students into capable consumers and producers of econometric studies. To be a good applied econometrician you must also understand theoretical issues, and much of the course will present theoretical arguments. To see how these arguments play out in real applications we will discuss journal articles applying econometric techniques.

The topics range from an overview of probability theory to the common issues that arise when formulating econometric models: endogeneity; functional form; making good estimates of sampling variability; sources of exogenous variation; and opportunities and problems stemming from the use of longitudinal data. Emphasis will be placed on the estimation of causal relationships from observational data, particularly using instrumental variables methods. Use of the statistical software *Stata* is mandatory and examination questions may involve Stata commands.

Evaluation will be based on a midterm exam, a final exam, and assignments.

3   OBJECTIVES.

After finishing this course you should be able to:

1. Read journal articles using applied econometrics with an informed and critical eye.

2. Evaluate the credibility of statistical arguments in the academic literature and elsewhere.

3. Develop econometric models to address research questions.

4. Estimate econometric models using the statistical software *Stata*.

5. Present econometric results in writing in a clear manner.

4   EVALUATION.

Course evaluation is as follows.

midterm examination (tentative: February 28)	25
final examination	50
assignments	25

The course grade is then calculated using the weights indicated above. As a guide to determining standing, these letter grade equivalences will generally apply:

A+	95-100	A	87-94	A-	80-86	B+	75-79	B	65-74
B-	55-64	C+	50-54	C	45-49	D	40-44	F	< 40

If, for some reason, the distribution of grades determined using the aforementioned conversion chart appears to be abnormal the instructor reserves the right to change the grade conversion chart if the instructor, at the instructor's discretion, feels it is necessary to more fairly represent student achievement.

You must pass the final examination to receive a passing grade in the course.

Non-programmable calculators will NOT be allowed during the writing of tests or final examinations.

There will be a Department scheduled final examination, lasting 3 hours.

5 Assignments.

There will be four assignments focusing on developing your computing skills. You are encouraged to collaborate with your colleagues while working on these assignments, however, you must write up your results on your own.

Note that the examinations, by necessity, will test a different skill set than that developed in the assignments. You are encouraged to do old exams as practice for the examinations.

Please note that there may be questions on examinations which ask you to interpret or write *Stata* code.

6 Required and recommended materials.

6.1 Text.

The course textbook is Davidson and Mackinnon, *Econometric Theory and Methods*. Corrections and other additional material are available at the text's web site.

However, much of the material will be drawn from journal papers, which are hyperlinked in this document. Generally, these papers are applied examples of the methods under discussion. Other references you may find useful include:

- Stock and Watson, *Introduction to Econometrics.*

  Stock and Watson is an advanced undergraduate level text. It contains lucid descriptions of many econometric ideas, and may serve as a useful reminder for more basic material.

- Greene, *Econometric Analysis*,

  Greene is a graduate level text which is quite comprehensive. It contains particularly good exposition on maximum likelihood and limited dependent variable models.

- Wooldridge, *Econometric Analysis of Cross Section and Panel Data.*

  A modern graduate level text. Contains no discussion of strongly dependent processes. Somewhat advanced for our purposes, but an excellent reference.

- Kennedy, *A Guide to Econometrics.*

  Non-technical discussion of many concepts. A good companion to any of the graduate level texts above.

There are also a number of econometrics textbooks available for free online which you may like to use as supplemental material. For example,

http://pareto.uab.es/mcreel/Econometrics/econometrics.pdf

contains links to a number of free resources.

6.2 SOFTWARE.

We will make extensive use of the statistical software Stata. You may use any version of Stata, but version 8.0 or higher will minimize difficulties you may encounter with commands whose syntax has changed over time. Some of the datasets we will use are quite large, so you should not use "small" Stata or another student version.

Stata is installed on the PCs in the department reading room and in the other computing centers in Social Sciences. You may also wish to purchase Stata, particularly if you intend to go on to doctoral studies in economics. To order Stata, follow this link:

http://www.stata.com/order/new/edu/gradplans/gp2-order.html.

Do not purchase "small" Stata as its limitations render it inadequate for our purposes. Purchase Stata SE or better.

7 OUTLINE.

1. **Review of probability theory.**

    ○ random variables

    ○ probability and distributions

    ○ conditional and marginal distributions

    ○ moments and conditional moments

2. **The linear regression model.**

    ○ as a model of the conditional mean

    ○ estimation: by moments, by least squares, by maximum likelihood

    ○ small sample properties: sampling distribution, bias, efficiency

    ○ large sample properties, including asides on central limit theorems and laws of large numbers

    ○ specification: dummy variables, interactions, linear v nonlinear models

    ○ making the data confess: when to stratify, when to sequentially include control variables

3. **Hypothesis testing.**

   ○ the logic of classical hypothesis testing
   ○ size and power: is higher n a good thing or a bad thing?
   ○ testing in the linear model: the t-ratio, F statistics, and the Holy Trinity.
   ○ picking the data up by their bootstraps

4. **Serial correlation, clustering, and heteroskedasticity.**

   ○ serial correlation due to time or location
   ○ clustering issues arising from survey data
   ○ heteroskedasticity: a big word for a small problem
   ○ HCCMEs and other robust covariance estimates

5. **Correlation and causation: Endogenous regressors.**

   ○ what do we mean by a "causal" model?
   ○ when can we assign a causal interpretation to OLS?
   ○ common issues leading to endogeneity problems using economic data: unobserved heterogeneity, simultaneity, measurement error

6. **Instrumental variables.**

   ○ the logic of IV: causal inference from observational data
   ○ estimation using IV
   ○ sources of exogenous variation
   ○ pitfalls: weak instruments, invalid exclusion restrictions
   ○ an introduction to treatment effects: correctly interpreting IV estimates in the presence of parameter instability

7. **Methods for limited, censored, and selected data.**

   ○ issues in numerical maximization of statistical objective functions
   ○ binary dependent variables
   ○ censored dependent variables
   ○ non–randomly selected samples

8. **Methods for panel and time series data.**

   ○ the advantages and disadvantages of panels and repeated cross-sections
   ○ time trends
   ○ differences in differences (in differences)
   ○ random effects and fixed effects
   ○ a brief introduction to highly persistent processes

8 READINGS.

1. **Review of probability theory.**

   D&M Chapter 1.2.

   Oreopoulis, P. (2003) The Long-Run Consequences of Growing up in a Poor Neighborhood, *Quarterly Journal of Economics*, 118 (4):1533-1575.

2. **The linear regression model.**

   D&M Chapters 2 and 3.

   Chou, S.-Y., Grossman, M., and Saffer, H. (2004). An economic analysis of adult obesity: Results from the behavioral risk factor surveillance system. *Journal of Health Economics*, 23, 565-587.

   Levitt, S. and C. Syverson (2004) Market distortions when agents are better informed: The value of information in real estate, NBER Working Paper 11053.

   Mullahy, J. and J. Sindelar (1993) Alcoholism, Work, and Income. *Journal of Labor Economics* 11: 494-520.

   Peters, B. and E. Stringham (2007) No booze? You may lose: Why drinkers earn more money than nondrinkers, Working paper, San Jose State U.

3. **Hypothesis testing.**

   D&M Chapter 4, 5.1, 5.2, 5.4.

   Case, A. and C. Paxson (2006) Stature and status: Height, ability, and labor market outcomes NBER 12466.

   Dahl, G. and S. DellaVigna (2008) Does movie violence increase violent crime? NBER 13718.

   Leamer, E., (1983) Let's Take the Con Out of Econometrics, *American Economic Review*, Vol. 73, No. 1, pp. 31-43

   McCloskey, D. and S. Ziliak. (1996) The Standard Error of Regressions. *Journal of Economic Literature*, pp. 97-114.

4. **Serial correlation, clustering, and heteroskedasticity.**

   D&M Chapter 7.

   Moulton, B. (1986): Random Group Effects and the Precision of Regression Estimates, *Journal of Econometrics*, 32, pp. 385-97.

5. **Correlation and causation: Endogenous regressors.**

D&M 8.1, 8.2.

DiNardo, John; Jorn-Steffen Piscke. The Returns to Computer Use Revisited: Have Pencils Changed the Wage Structure Too? *Quarterly Journal of Economics*, Vol. 112 (February 1997): 291-303.

Gentzkow, M. and J. Shapiro (2006) Does television rot your brain? New evidence from the Coleman Study, Working paper, University of Chicago.

6. **Instrumental variables.**

   D&M Chapter 8.3 — 8.11, 9.2.

   Examples of instrumental variables strategies:

   Acemoglu, D., S. Johnson and J. Robinson (2001) The Colonial Origins of Comparative Development: An Empirical Investigation, *American Economic Review*, 91(5), 1369-1401.

   Angrist, J. and W. Evans (1998): Children and their Parents Labor Supply: Evidence from Exogenous Variation in Family Size, *American Economic Review*, 450-477.

   Gentzkow, M. and J. Shapiro (2006) Does television rot your brain? New evidence from the Coleman Study, Working paper, University of Chicago.

   Hamilton, B. and V. Hamilton and N. Mayo (1996) What Are the Costs of Queuing for Hip Fracture Surgery in Canada?, *Journal of Health Economics*, 15 (1996) 161-185.

   Levitt, S. (1996) The Effect of Prison Population Size on Crime Rates: Evidence from Prison Overcrowding Litigation, *Quarterly Journal of Economics*, Vol. 111, No. 2, pp. 319-351

   Schmeiser, M. (2007) Expanding Wallets and Waistlines: The Impact of Family Income on the BMI of Women and Men Eligible for the Earned Income Tax Credit, working paper, Cornell U.

   Stinebrickner, T. and R. Stinebrickner, The causal effect of studying on academic performance, Working paper, University of Western Ontario.

   Potential problems with IV estimation.

   Auld, M.C. and Grootendorst, P. (2004) An empirical analysis of milk addiction. *Journal of Health Economics* 23:1117-1133.

   Bound, John, David A. Jaeger, and Regina M. Baker, Problems with instrumental variables estimation when the correlation between the instruments and the endogenous explanatory variable is weak, *Journal of the American Statistical Association*, Vol 90, No. 420, June, 1995, pp. 443-540.

Dranove, D., and P. Weiner, (1994), Physician-Induced Demand for Childbirths, *Journal of Health Economics*, 13, March, pp. 61-73.

IV estimates in the presence of parameter instability

Manning, A. (2004) Instrumental Variables for Binary Treatments with Heterogenous Treatment Effects: A Simple Exposition, *Contributions to Economic Analysis and Policy*, 3(1), Article 9.

7. **Methods for limited, censored, and selected data.**

D&M Chapter 10.1—10.5, Chapter 11.

Delvande, A., D. Goldman, and N. Sood (2007) Criminal prosecution and HIV-related risky behavior, NBER 12903.

McCullough and Vinod (1999) The numerical reliability of econometric software, *Journal of Economic Literature*, vol. 37, issue 2, pp 633-665

Visser, M., W. Harbaugh, and N. Mocan (2006) An experimental test of criminal behavior among juveniles and young adults, NBER 12507.

8. **Methods for panel and time series data.**

D&M Chapter 7.10, 13.2, 14.2.

Card, David and Alan B. Krueger (1994), Minimum Wages and Employment: A Case Study of the Fast Food Industry. *American Economic Review* 84(4), (1994): 772-793.

DellaVigna, S, and E. Kaplan (2006) The Fox News Effect: Media Bias and Voting, Working paper, UC Berkeley.

Donohue, J. and S. Levitt (2001), The Impact of Legalized Abortion on Crime, *Quarterly Journal of Economics*, 116(2): 379-420.

9   NOTES.

Students seeking reappraisal of a piece of graded term work (term paper, etc.) should discuss their work with the Instructor within fifteen days of the work being returned to the class.

It is the student's responsibility to request academic accommodations. If you are a student with a documented disability who may require academic accommodation and have not registered with the Disability Resource Centre, please contact their office at 220-8237. Students who have not registered with the Disability Resource Centre are not eligible for formal academic accommodation. You are also required to discuss your needs with your instructor no later than fourteen (14) days after the start of this course.