UNIVERSITY OF CALGARY
DEPARTMENT OF ECONOMICS

ECONOMICS 715
ADVANCED ECONOMETRICS III:
TOPICS IN MICROECONOMETRICS

1 COURSE INFORMATION.

Instructor.	Chris Auld
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	Social Science tower room 436
Homepage.	http://jerry.ss.ucalgary.ca/e715.html
Course Hours.	3 lecture hours per week, plus occasional tutorials
Course location:	TBA.
Office hours:	TBA.

2 COURSE DESCRIPTION.

This course surveys selected topics in modern applied microeconometrics, with a focus on pragmatic issues in empirical strategy. The course opens with a review of the linear regression model and estimation and inference. We move on to discuss common challenges that arise with the use of observational data. The remainder of the course considers various approaches to dealing with those challenges, emphasizing a modern understanding of instrumental variables. Other topics include matching, regression discontinuity designs, limited dependent variables, and strategies available with panel data. Time permitting, the course will close with a discussion of non and semiparametric methods and resampling and simulation methods. We will frequently demonstrate methods using Stata and discuss journal articles, so bringing a laptop to class will often be helpful.

3 REQUIREMENTS.

The student is expected to be sufficiently comfortable with mathematical, economic, and econometric concepts to do well in a course such as Economics 615 (introductory graduate econometrics). Familiarity with *Stata* is expected and knowledge of other programming languages may be useful.

4 Materials.

You must purchase Stata or use PCs on campus with Stata installed. If you intend to purchase, do not buy the "small" version, which has limitations which render it inappropriate for this course or for most research purposes. It is not critical that you have the latest version (11), but it is preferable that you get at least version 8.

The required book is

Angrist and Pischke, *Mostly Harmless Econometrics: An Empiricist's Companion*.

The course is very loosely structured on Angrist and Pischke. Since this book is not a textbook, you must supplement with a graduate level microeconometrics textbook. The recommended textbook, and the book referenced in the readings, is

Cameron and Trivedi, *Microeconometrics: Methods and Applications* (2005).

We will also make use of several lectures from the 2007 NBER Summer Institute given by Guido Imbens and Jeff Wooldridge. Links to the slides, lectures and notes can be found here: http://www.nber.org/minicourse3.html

Other texts you may find useful include:

Davidson and MacKinnon (1993) *Estimation and inference in econometrics.*

Davidson and MacKinnon (2004) *Econometric theory and methods.*

Greene, *Econometric Analysis.*

Stock and Watson, *Introduction to Econometrics.*

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

5 Problem sets.

There will be one or two problem sets given during first half of the course. There will be some problems which will have you manipulating equations to demonstrate theoretical results. However, the focus will be on analysis of datasets which you will be given. You will develop, estimate, and intepret appropriate models to answer economically interesting questions.

6 Paper.

You will write a short paper with the goal of replicating and extending a published paper. Choose a recently published journal article or (preferably) working paper. Note that many papers use confidential or otherwise inaccessible data, so you must select carefully. There are several sources on the web where you may download data (and sometimes code) for published papers, notably including the *Journal of Applied Econometrics* data archive and the *Mostly Harmless Econometrics* web site. Many researchers also make data available on their personal web pages, and many datasets are readily available, notably Census data. Please see the instructor should you wish to choose to a paper with replication code available, as we will have to modify the replication stage of the paper in a such a case.

The first part of the paper (five to ten double–spaced pages) should discuss the econometric framework the paper uses and the results of your attempt to replicate the analysis.

The second part of the paper (about five pages) will be, in effect, an extended referee report: you are to critically assess the paper's contribution, noting the magnitude of the contribution, how the paper fits into the literature, and a detailed discussion of the strengths and weaknesses of the econometric strategy the paper employs.

The third part of the paper (no more than five pages) should discuss a small novel contribution to the paper you make: this may be any additional estimates or hypothesis tests you execute with the same data to go further than the results discussed in the paper. For example, you may report on specification tests that the paper omitted, you may add interactions, quadratic terms, or make other changes to the specification to investigate robustness, you might try a different estimator than the authors chose, or you might design a (very) small Monte Carlo experiment to investigate power or some other property of the estimated models.

Finally, you will prepare a 15 minute presentation briefly summarizing the paper, your replication attempt, your critical assessment, and your contribution.

7 Evaluation.

Course evaluation is as follows.

problem sets	30%
paper and presentation	30
final examination	40

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

Items are marked on a numerical basis. 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.

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.

8 OUTLINE.

1. **. Introduction: Inferring causality from observation.**

   - Notions of causality in econometrics and other disciplines.
   - Problems in empirical microeconomics: selection bias, simultaneity bias, measurement error.
   - Overview of methods to overcome common problems.

2. **. Review: the linear model.**

   - estimation: by moments, by least squares, by maximum likelihood
   - small sample properties
   - large sample properties, including review of laws of large numbers and central limit theorems
   - GLS, robust covariance estimators, heteroskedasticity, serial correlation, clustering
   - Covariance matrix estimation.
   - classical hypothesis testing, size, and power

3. **Instrumental variables and matching.**

   - Statistical implications of endogeneity
   - The IV estimator, indirect least squares and GMM derivations.
   - Small and large sample properties
   - Identification
   - Weak instruments
   - Testing overidentifying restrictions
   - Selectivity, IV, and control functions
   - Matching methods compared to IV.

4. **Instrumental variables: contemporary issues**

   - Essential heterogeneity: implications for OLS and IV.
   - Local instrumental variables: LATE, MTE, TT, ATT.
   - The Roy model and its generalization.
   - Estimation.

5. **Methods for panel data.**

   ○ OLS and panel data.

   ○ Random effects and fixed effects, Mundlack's method.

   ○ First and long differencing.

   ○ Measurement error and panel methods.

   ○ IV panel methods.

6. **Methods for limited dependent variables.**

   ○ Linear probability, probit, and semiparametric binary response models.

   ○ Computational issues in numerical optimization.

   ○ Models for censored data.

   ○ Simulation–based estimators.

   ○ Identification in simultaneous nonlinear models.

7. **Miscellaneous topics (time permitting).**

   ○ The bootstrap and other resampling methods.

   ○ Regression discontinuity designs.

   ○ Non and semiparametric methods.

9 READINGS.

1. **Introduction: Inferring causality from observation.**

   Cameron and Trivedi, Chapter 2.

   Angrist and Pischke, Chapter 2.

   Angrist, Joshua and Alan Krueger (1999), "Empirical Strategies in Labor Economics," in the Handbook of Labor Economics, Vol. 3A, O. Ashenfelter and D. Card, eds. Amsterdam: Elsevier Science.

   Angrist, Joshua and Jorn-Steffen Pischke (2010) "The Credibility Revolution in Empirical Economics: How Better Research Design Is Taking the Con out of Econometrics," Journal of Economic Perspectives, vol. 24(2), pages 3-30, Spring.

   Auld, M.C. and Grootendorst, P. (2010) Challenges for causal inference in obesity research, forthcoming, Handbook of the Social Science of Obesity, J. Cawley (ed), Oxford.
   http://jerry.ss.ucalgary.ca/auldgrootendorstv16.pdf

   Heckman, J. 2008. "Econometric Causality," International Statistical Review, International Statistical Institute, vol. 76(1), pages 1-27, 04. (Also available as NBER 13934).

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

   Meyer, Bruce D. (1995), "Natural and Quasi-Experiments in Economics", Journal of Business and Economic Statistics, (13:2), pp. 151-161.

   Winship, Christopher and Stephen L. Morgan (1999) "The Estimation of Causal Effects from Observational Data." Annual Review of Sociology, 25(659-706).

2. **Review: The linear model, estimation, hypothesis testing.**

   Cameron and Trivedi, Chapter 4.1 — 4.7, 5.5, 7.

   Angrist and Pischke, Chapters 3, 8.

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

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

3. **Instrumental variables and matching.**

   Cameron and Trivedi, Chapters 4.8, 4.9, 6.4, 16.5, 25.4

Angrist and Pischke, Chapters 4.1 — 4.3

J. Angrist and A. Krueger (2001) "Instrumental Variables and the Search for Identification," Journal of Economic Perspectives.

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 (1995) "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, pp. 443-540.

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.

Imbens, Guido, and Jeffrey Wooldridge "Weak Instruments and Many Instruments Lecture 13, Whats New in Econometrics? NBER, Summer 2007. http://www.nber.org/~confer/2007/si2007/WNE/lect_13_weakmany_iv.pdf.

Smith, Jeffrey and Petra Todd. 2005. "Does Matching Overcome LaLondes Critique of Nonexperimental Methods? Journal of Econometrics 125(1-2): 305-353.

4. **Instrumental variables: Contemporary issues.**

Cameron and Trivedi, Chapter 16.7.

Angrist and Pischke, Chapter 4.4.

Heckman, James (1997) "Instrumental Variables: A Study of Implicit Behavioral Assumptions Used in Making Program Evaluations. Journal of Human Resources. 32(3). 441-452.

Heckman, J., S. Urzua, and E. Vytlacil (2006) "Understanding instrumental variables in models with essential heterogeneity," Review of Economics and Statistics, 88(3):389–432.

Imbens and J. Angrist, (1994) "Identification and Estimation of Local Average Treatment Effects," Econometrica.

Imbens, Guido and Jeffrey Wooldridge "Instrumental variables with treatment effect heterogeneity: Local average treatment effects," Lecture 6 in What's New in Econometrics? NBER, Summer 2007. http://www.nber.org/WNE/slides_5_late7-30-07.pdf.

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

5. **Panel data.**

   Cameron and Trivedi, Chapter 21, 22.6, 25.5.

   Angrist and Pischke, Chapter 5.

   Bertrand, M., E. Duflo, and S. Mullainathan (2004), "How Much Should We Trust Differences in-Differences Estimates?", Quarterly Journal of Economics, February, 119(1): 249-275.

   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.

   Donohue, John J., III, Levitt, Steven D. "Further Evidence that Legalized Abortion Lowered Crime: A Reply to Joyce," J. Human Resources 2004 33: 29-49

   Imbens, Guido, and Jeffrey Wooldridge "Difference in Difference Estimation," Lecture 10 Whats New in Econometrics? NBER, Summer 2007. http://www.nber.org/~confer/2007/si2007/WNE/lect_10_diffindiffs.pdf.

   Joyce, Ted (2004) "Did Legalized Abortion Lower Crime?" J. Human Resources 2004 33: 1-28.

6. **Limited dependent variables.**

   Cameron and Trivedi, Chapter 5.6, 10, 14.1–14.4.

   Angrist and Pischke, Chapter 3.4.2.

   Auld, M.C. (2005) "Smoking, drinking, and income." Journal of Human Resources 40(2):505-518.

   Horowitz, Joel and N.E. Savin (2001) "Binary Response Models: Logits, Probits and Semiparametrics." Journal of Economic Perspectives 15(4): 43-56.

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

7. **Miscellaneous Topics.**

   Cameron and Trivedi, Chapters 9, 11

   Angrist and Pischke, Chapter 6.

Angrist, Joshua and Victor Lavy (1998) "Using Maimonides Rule to Estimate the Effect of Class Size on Scholastic Achievement, Quarterly Journal of Econometrics, 114, 533-575.

Efron, Bradley and Gail Gong (1983) "A Leisurely Look at the Bootstrap, the Jackknife and Cross-Validation. American Statistician. 37(1): 36-48.

Imbens, Guido and Thomas Lemieux (2007) "Regression Discontinuity Designs: A Guide to Practice, NBER Technical Working Paper 337
http://www.nber.org/papers/t0337.pdf

Rosenbaum, Paul and Donald Rubin (1983), "The Central Role of the Propensity Score in Observational Studies for Causal Effects," Biometrika 70:1, 41-55.

10 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.

Safewalk / Campus Security: 220-5333

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