University of Victoria
Department of Economics

Economics 548
Applied Microeconometric Modelling
Spring 2016

1 Course information.

Instructor.	Chris Auld auld@uvic.ca 250.721.8537 BEC 348
Online resources.	See *Coursespaces*.
Course hours.	3 lecture hours per week, plus labs, which will be held on a discretionary basis.
Course location:	BEC 363, Tuesdays and Fridays, 11:00–12:20
Office hours:	Wednesdays 10:30–11:30, or drop–in or by appointment
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. Economics 545 or equivalent is recommended but not required.

2 Prerequisites.

The course is geared towards students who have taken or are simultaneously taking Economics 545, or equivalent. Economics 545 is not, however, a formal pre or corequisite. You should be comfortable with theory using matrix algebra, have a good grasp of basic probability theory, and have a thorough understanding of the linear multivariate regression model. Familiarity with Stata is also advantageous, although also not necessary.

3 Course description.

The goal of the course is to equip students with the statistical tools and insight required to produce and critically evaluate research in applied microeconometrics. Some of the topics we will consider include:

- What does "causal" mean in science? The potential outcomes framework.
- When can OLS regression by interpreted as yielding causal estimates?
- A modern guide to finessing non–spherical errors: HCCMEs, HACs and clustering.
- The logic and pitfalls of frequentist inference.
- The practice of applied econometrics:
  - Issues relating to size and power.
  - p–values and how not to misinterpret them.
  - p–hacking, publication bias, and the "replication crisis" in science.
  - Is the difference between significant and insignificant significant?
  - Statistical vs economic significance.
- Classical instrumental variables.
- Instrumental variables and heterogeneous treatment effects.
- Where do we get instruments?
- Panels: difference–in–difference and related methods.
- Regression discontinuity designs.
- Topics as time permits: conditional and unconditional quantile regression, nonlinear models for limited dependent variables, computational issues,

All topics will be addressed using a combination of blackboard theory, applied examples from the literature, and hands-on computing exercises using Stata.

4 Objectives.

After finishing this course you should be able to:

1. Evaluate the credibility of statistical evidence presented in the academic literature and elsewhere, particularly research attempting to draw causal inferences from observational data.
2. Develop appropriate microeconometric models to address research questions.
3. Locate, download, and process datasets from online repositories.
4. Manipulate data, calculate descriptive statistics, conduct simulations, write simple programs, estimate microeconometric models, draw graphs, and generate publication-ready tables of results using *Stata* or *R*.
5. Present results in a clear manner.

5 Evaluation.

Course evaluation is as follows.

final examination	50%
assignments	50%

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

A+	90-100	A	85-89	A-	80-84	B+	77-79	B	73-76
B-	70-72	C+	65-69	C	60-64	D	50-59	F	< 49

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.

The examination will either be a three–hour written exam or a take–home examination, at the instructor's sole discretion as informed by feedback from the class. You must pass the final examination to receive a passing grade in the course.

6 Assignments.

There will be assignments focusing on developing your computing skills, working with econometric theory, writing up results, and evaluating published research. You are encouraged to collaborate with your colleagues while working on the computational aspects of these assignments, however, you must write up your results on your own.

7 Recommended materials.

Previous versions of this course required the Cameron and Trivedi textbook. This year, there is no required textbook, but the following materials are recommended.

7.1 Highly recommended.

A. C. Cameron and P. Trivedi (2010), *Microeconometrics Using Stata*.

J. Angrist and J.-S. Pischke (2009), *Mostly Harmless Econometrics: An Empiricist's Companion*.

7.2 Useful supplemental and reference texts.

- 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.

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

  "Papa" Wooldridge is a graduate level text which is quite comprehensive, and is an excellent reference for the methods we will cover and many extensions.

- Cameron and Trivedi, *Microeconometrics: Methods and Applications*

  A more comprehensive and formal treatment than that in the same authors' *Microeconometrics Using Stata*.

7.3 Software.

You may use any software you wish so long as that software is Stata (but see note below).

We will make extensive use of the statistical software Stata. The current version of Stata is 14, but any version at least as recent as 8.0 will suffice for the purposes of the

course. Some of the datasets we will use are quite large, so you should not use "small" Stata or another student version. "Small" Stata will typically also prove too limited for use in research for your Master's essay or doctorial thesis.

Stata is installed on student computing facilities on campus. You may also wish to purchase Stata (either a permanent copy or a temporary lease), particularly if you are a Ph.D. student or intend to become one. To order Stata, follow this link:

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

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

Note. Currently, the only reasonable alternative to Stata for applied microeconometrics is R. If you wish to use R to complete your assignments and the take–home final, you may do so. However, all demonstrations in class will use Stata, and therefore you should have access to Stata nonetheless.

7.4 Computing.

A laptop computer with Stata installed is highly recommended so that we may interactively solve econometric problems in class.

8 Notes.

Late Assignments.

If you must hand an assignment in late, please contact me before the due date to discuss the issue. If you do not hand in an assignment on time and do not discuss the issue with me beforehand, I may either refuse to accept the assignment or dock points, at my sole discretion.

Contacting the Instructor.

Questions regarding class material should usually be posed during class or in person during office hours. It is not feasible to provide lengthy explanations of class material over email. Should you send email for whatever reason, please put "ECON 548" in the subject line.

Travel Plans

Students are advised not to make work or travel plans until after the examination timetable has been finalized. Students who wish to finalize their travel plans at an earlier date should book flights that depart after the end of the examination period. There will be no special accommodation if travel plans conflict with the examination.

Policies.

Department policies on integrity, exclusivity, and other issues are in effect and detailed here: http://web.uvic.ca/econ/undergraduate/course_policies.php

The University of Victoria is committed to promoting, providing and protecting a positive, supportive and safe learning and working environment for all its members.

9 Tentative Outline.

1. Introduction.
   (a) Correlation and causation.
   (b) Potential outcomes and counterfactuals.
   (c) Endogeneity: omitted variables, simultaneity, measurement error.
2. Linear regression.
   (a) Univariate and multivariate linear regression models.
   (b) The theorem of Frisch, Waugh, and Lovell.
   (c) Agnostic regression.
   (d) Structural interpretations of regression models.
   (e) Pragmatic issues and OLS: dummies, interactions, goodness of fit.
   (f) Issues in estimating standard errors.
   (g) "Bad controls," mediation.
3. Interpreting and evaluating results.
   (a) The logic and pitfalls of frequentist hypothesis testing.
   (b) Economic significance versus statistical significance.
   (c) p–values and how to avoid misinterpreting them.
   (d) The difference between significant and insignificant may not be significant.
   (e) p–hacking and publication bias.
   (f) Multiple comparisons.
4. Instrumental variables.
   (a) The linear IV estimator and its statistical properties.
   (b) The generalized method of moments.
   (c) Weak instruments and invalid exclusion restrictions.
   (d) Properties and diagnostic tests with constant effects.
   (e) Instrumental variables with heterogeneous effects.
   (f) Notions of average causal effects.
   (g) The search for identification: where do we get instruments?
5. Models for panel data.
   (a) First difference and difference in difference methods.

(b) Fixed effects.

(c) Standard errors with panel data.

(d) Balance tests.

(e) Placebo tests.

6. Topics (as time permits).

(a) Regression discontinuity.

(b) Matching.

(c) Quantile regression.

(d) Nonlinear models for limited dependent variables.

10 Reading list.

11 Introduction.

MHE, chapter 2.

Anwar, S., P. Bayer, and R. Hjalmarsson (2012) The impact of jury race in criminal trials, Quarterly Journal of Economics, 127: 1017-1055.

LaLonde, R. (1986) "Evaluating the Econometric Evaluations of Training Programs with Experimental Data," American Economic Review 76, September 1986, 604-62

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

12 Linear regression.

MHE, chapter 3.

Cameron and Trivedi, chapter 3.

C. Cameron and D. Miller, A Practitioners Guide to Cluster-Robust Inference, Journal of Human Resources 50(2), February 2015, 317-372.

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

Moulton, B., "Random Group Effects and the Precision of Regression Estimates, Journal of Econometrics 32(3), 1986, 385-397.

Young, A. (2015) Channelling Fisher: Randomization Tests and the Statistical Insignificance of Seemingly Significant Experimental Results, London School of Economics, mimeo, October 2015.

13 Practical issues.

Butler, D. (2013) "Investigating journals: The dark side of publishing, Nature 495(7442), 433435.

Gelman, A. and H. Stern (2006) The difference between 'significant' and 'not significant' is not itself statistically significant, The American Statistician, 60(4), 328–331.

Head, M. et al (2015) The extent and consequences of p-hacking in science," PLOS Biology.

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.

Necker, S. (2014) "Scientific misbehavior in economics," Research Policy, 43(10), 1747-1759.

14 Instrumental variables.

MHE chapter 4.

Cameron and Trivedi, chapter 6.

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

Aizer, A. and J. Doyle Jr. (forthcoming) "Juvenile Incarceration, Human Capital and Future Crime: Evidence from Randomly-Assigned Judges," forthcoming at the Quarterly Journal of Economics.

Albouy, D. (2012) "The Colonial Origins of Comparative Development: An Empirical Investigation: Comment." American Economic Review, 102(6), October 2012, pp. 3059-3076.

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

Angrist J. and A. Krueger (2001) "Instrumental Variables and the Search for Identification," Journal of Economic Perspectives 15(4), 2001, 69-85.

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.

Clay, K., J. Lingwall, and M. Stephens (2016) Laws, Educational Outcomes, and Returns to Schooling: Evidence from the Full Count 1940 Census NBER working paper #22855.

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

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.

Kitagawa, T. (2015) "A Test for Instrument Validity," Econometrica 83(5), 2043-2063.

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

15 Panel data.

MHE chapter 5.

Cameron and Trivedi, chapters 8 and 9.

D. Almond, J. Doyle, A. Kowalski, and H. Williams, Estimating the Marginal Returns to Medical Care: Evidence from At-Risk Newborns, The Quarterly Journal of Economics 125(2), 2010, 591-634.

Andersson, F. *et al* (2016) Childhood Housing and Adult Earnings: A Between-Siblings Analysis of Housing Vouchers and Public Housing, NBER working paper #22721.

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

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.

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

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

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.

16 Topics.

MHE chapters 6 and 7.

Doleac, J. and N. Sanders (2015) Under the Cover of Darkness: How Ambient Light Influences Criminal Activity, Review of Economics and Statistics, 97(5), 1093–1103.

Lee, D. and T. Lemieux (2010) "Regression discontinuity designs in economics," Journal of Economic Literature, vol 163, 281-355.

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