Economics 7828 - Econometrics
Spring 2016

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          Economics 7828 is a course in intermediate econometrics for PhD students.
Building upon the statistical foundations presented in 7818, this course covers both
theoretical and applied aspects of econometrics. Economics 7818 is the prerequisite for
this course, which requires a solid background in mathematical statistics and matrix
algebra. Our text also presents a brief summary of the essentials of matrix algebra and
multivariate statistics in appendices A and B.
          You will be actively working with computers in this course. Computer exercises
and instruction are provided for both EViews and Stata econometrics packages that are
available on our PC network. These exercises are designed to illustrate the use of an
econometric software package and to develop skills in the application of econometric
tests and procedures to economic data. Instructions and data sets for these exercises
will be accessible from the D2L site for our class. If you prefer to use a different
econometric software package, such as R, this is fine, but you will have to learn this
alternative software on your own.
          Homework problems will be assigned periodically, and completion of these is
essential to learning econometrics and, incidentally, doing well on the exams and the
project. You are encouraged to form teams of two for working homework problems,
computer exercises, and the applied econometrics project described below. Each team
needs to submit only one copy of any assignment.
          Your grade in the course will be based on a midterm exam and a final exam,
each counting towards 30% of your grade, and homework (including computer
exercises) and an applied regression project, each for 20% of your grade.

Applied Econometrics Projects
          The project involves the application of econometric analysis to the estimation and
testing of a model of your team's choice. Your written paper will resemble empirical
papers in social science or business research, but with more details on the econometric
analysis than you might find in published articles. Ideas for topics may be found in The
Review of Economics and Statistics, Applied Economics, and other applied economics
journals. You may also get some ideas from other economics courses, and from
examples presented in the text, the EViews/Stata exercises, or in lectures.
          Although the topic choice is fairly open-ended, I want to make sure that every
team finds an appropriate topic and does so long before the end-of-term rush. You are
therefore required to submit a brief written proposal identifying the topic you will
investigate, sketching a tentative model for estimation, describing hypotheses to be
tested and questions to be addressed, and identifying the data sources and some
background literature relevant to your project. This can be done in two or three pages.
This proposal is due on Thursday, February 25. You are invited to discuss your ideas
with me at any time during the development of your project. One purpose of this

proposal is to have you identify your data sources early in the term so that you will not be caught later in the semester with a project that is not feasible for lack of data.

Once we have agreed on a project you should collect the necessary data and proceed with the estimation. In estimating your model there may be several variants you will try (alternative functional forms, differing variable definitions, alternative lag structures, alternative estimation techniques etc.). You will likely encounter various econometric problems or be involved with advanced estimation procedures (panel data methods, logit-probit models, instrumental variables estimation, etc.). An important part of your assignment is dealing with econometric problems (autocorrelation, heteroscedasticity, multicollinearity, etc.) or implementing advanced estimation procedures. In some cases we will not have covered your econometric method before you need to proceed with the estimation, so you will need to read about this topic on your own. The evaluation of your project will reflect, in part, your skill in handling these econometric problems, the sophistication of the analysis, and your interpretation and testing of variants of your basic model.

When you have completed your estimation, you should prepare your final report following the format of empirical articles in economics journals. Typically these papers include the following:

1. Introductory overview of the research question; statement of objectives.

2. Presentation of theory and review of relevant theoretical literature.

3. Discussion of previous empirical work in the area; critique and explanation of why your approach is vastly superior, or at least different.

4. Specification of your model(s) to be estimated; description of estimation method; variable definitions and description of data sources.

5. Presentation of results: estimated equations and summary statistics; results of tests of econometric problems and description of corrective actions taken; results of statistical tests of hypotheses; comparison with other studies.

6. Discussion and conclusion; elaborate on the implications of your results for theory and policy; draw as much substantive content as possible from interpretations of your estimates and tests of hypothesis; present suggestions for further research (now that I have done all this work, this is how I would do it right).

7. Bibliography; list your data sources and any literature cited in the paper.

Keep in mind that any text or mathematical derivations that have been copied from other sources must be identified with quotation marks and given appropriate references. Quoted text should be kept to a minimum; most of the writing should be your own. When you have relied on other works for ideas (e.g., models, explanations, interpretations, etc.) these sources must be given credit also. Our Department now requires submission of a cover sheet for the paper that attests that the research and the writing are your own, and I will make sure that you have access to this cover sheet.

Your final paper is due on Thursday, April 21. Include with your written paper **selective** computer printouts of your most important results, with some guide to the output in your text. Late papers will be penalized by 10 percentage points if I receive it before I must post grades, and by 20 percentage points if it is any later.

Readings and Topics

Text: Verbeek, Marno (2012) *A Guide to Modern Econometrics*, 4th edition. Wiley. [The third edition is also acceptable.]

0. Introduction: some econometrics controversies [Chapter 1; Readings: "Housing Experiment" and "Cause and Defect"]

I. Classical Linear Regression: least squares estimation, properties of estimators, and tests of simple hypotheses and general linear restrictions; alternative functional forms; dummy variables. [Chapters 2 and 3; Readings: Angrist and Pischke, "The Credibility Revolution in Empirical Econometrics"; Kraemer & Blasey, "Centring in regression analyses"]. In class we will develop the econometric theory of Chapter 2 in great detail, while you will cover on your own the more applied material of Chapter 3.

Assignments and due dates:
Pset 1: Two-variable model in matrix form. 1/19
Pset 2: linear algebra of regression model. 1/28
Pset 3: algebra of multivariate stats. 2/11
Computer exercise 1: introduction (Pinkham data). 2/16
Computer exercise 2: dummy variables. 3/1

II. Generalized Linear Model: heteroscedasticity [Chapter 4]. Analyze possible departures from the classical regression model using the DITS framework: (1) Definition of the problem; (2) Implications for OLS properties; (3) Testing for its occurrence; (4) Solution or treatment.

Midterm Examination – Thursday March 3

II. Generalized Linear Model (cont.): autocorrelation [Chapter 4; Reading: Granger, Hyung, & Jeon, "Spurious regressions with stationary series"].
Computer exercise 3: autocorrelation. 3/15

III. Endogeneity, Identification, Instrumental Variables and GMM Estimation [Chapter 5; Reading: Angrist & Krueger, "Instrumental Variables and the Search for Identification"]. In modern econometrics, endogeneity seems to be hiding in every model. We will follow a heuristic approach to the question of identification, with a more formal presentation of IV estimation. Angrist and Krueger present a more modern approach to identification and the uses of instrumental variables estimation.
Computer exercise 4 (simultaneous equations estimation) 4/5

IV. Panel data methods and seemingly unrelated regressions [Chapter 10]. Many of you may be working with panel or longitudinal data in your projects, and Chapter 10 presents more advanced methods than we will be able to cover in class.
Computer exercise 5 (panel data models). 4/14

V. Time Series Econometrics: stationarity, unit roots; cointegration and vector autoregressions [Chapter 8, pages 278-304 (or 269-293 in 3rd edition); Chapter 9, pages 338-354 (or 323-338 in 3rd edition). Reading: Granger & Newbold, "Spurious Regressions in Econometrics"]. Time series econometrics is not a major part of our curriculum in this Department, and this section will provide a brief introduction to some of the issues in this field.
Computer exercise 6: unit root testing. 4/26

VI. Limited Dependent Variables [Chapter 7]. I doubt we will have time to cover these topics, and I will not hold you responsible for this material. I list this chapter for completeness and because some of you may pursue a project using these methods.

Final Examination - May 4 (Wednesday 1:30-4:00)

CLASS AND UNIVERSITY POLICIES

(1) If you qualify for accommodations because of a disability, please submit a letter to me from Disability Services in a timely manner (for exam accommodations provide your letter at least one week prior to the exam) so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities. Contact Disability Services at 303-492-8671 or by e-mail at dsinfo@colorado.edu. If you have a temporary medical condition or injury, see Temporary Medical Conditions: Injuries, Surgeries, and Illnesses guidelines under Quick Links at Disability Services website and discuss your needs with me.

(2) Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. Please talk with me if you have scheduling conflicts. If a religious holiday conflicts with the due date of an assignment, I suggest that you turn it in early. If the holiday conflicts with an exam please make arrangements with me at least one week prior to the exam. See full details at http://www.colorado.edu/policies/fac_relig.html

(3) Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, color, culture, religion, creed, politics, veteran's status, sexual orientation, gender, gender identity and gender expression, age, disability, and nationalities. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. See policies at

http://www.colorado.edu/policies/classbehavior.html and at

http://www.colorado.edu/studentaffairs/judicialaffairs/code.html#student_code

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(5) All students of the University of Colorado at Boulder are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. All incidents of academic misconduct shall be reported to the Honor Code Council (honor@colorado.edu; 303-735-2273). Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion). Other information on the Honor Code can be found at http://www.colorado.edu/policies/honor.html and at http://honorcode.colorado.edu