ECON 645  
Empirical Analysis III: Econometric Modeling and Forecasting

Instructor  
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Grader / Teaching Assistant  
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Office hours: Before or after class, and by appointment

Course Description

This course is a study of empirical techniques that are particularly relevant to the analysis of microeconomic models. Emphasis is on limited dependent variables, instrumental variables, advanced panel data methods, and time series regressions.

Objectives

This capstone course in Empirical Analysis emphasizes advanced topics in econometric methods and modeling. At the end of the course, students should be able to:

- use linear and nonlinear regressions to answer economic questions
- detect the presence of (and correct for) multicollinearity, heteroskedasticity, serial correlation, and endogeneity
- become better users of STATA by expanding and deepening your skills and familiarity with the software

Prerequisites

Students must complete ECON 643 and 644 in order to enroll in this course

Texts and Readings

Required

- Website: If you are registered for this course, you can use your directory ID and password to access www.elms.umd.edu. Copies of this syllabus, lecture notes, problem sets, and other relevant documents will be made available through the course website.
- Data Management Using STATA: A Practical Handbook, Michael N. Mitchell

Highly recommended

- Microeconometrics using STATA, Cameron and Trivedi
- Econometrics, Peter Kennedy (lots of editions out there; newer is good, but older is cheap)
Recommended

- *Econometric Analysis*, 7th Edition, Prentice Hall, William H Greene (this is advanced)
- www.STATA.com
- Other sources: [http://www.ats.ucla.edu/stat/STATA/webbooks/reg/default.htm](http://www.ats.ucla.edu/stat/STATA/webbooks/reg/default.htm)

Additional required readings may be posted on the class website.

Structure of the Course

All classes will be taught in seminar format meeting once per week. The class meeting hours are 6:45-9:30 PM on Mondays (with a 15-minute break somewhere between 7:45 and 8:30 PM). Classes will make extensive use of STATA – providing hands-on exercises in a laboratory-type setting. There will be homework, problem sets and exams that require critically evaluating econometric models.

Course Outline

- Limited Dependent Variable Models
- Pooling Cross Sections across Time.
- Simple Panel Data Methods
- Advanced Panel Data Methods
- Instrumental Variables Estimation and Two Stage Least Squares
- Simultaneous Equations Models
- Introduction to Time Series
- Serial Correlation and Heteroskedasticity in Time Series Regressions

Coursework and Grading

- **Problems sets (20%)**: There will be five problem sets assigned throughout the semester. Problem sets are due before the *beginning* of class on the designated due date (see below). You will be asked to return your work as a single email attachment (e.g., STATA program, MS Word). You are expected to turn in reasonably formatted documents. You are encouraged to consult with classmates in completing the problem sets. You are allowed to give and receive help on the problems. However, you are NOT allowed to share problem sets (i.e., written answers, STATA code) with others.
• **Online meetings (5%)**: There will be at least three online discussions to conduct empirical analyses related to topics covered in class. We will start solving problems in class and you will have an opportunity to (i) complete the rest through online discussions with your classmates, and (2) ask each other questions or offer alternative methods of answering the same question. The dates of the online discussions will be announced throughout the term.

• **Midterm Exam (35%)**: The midterm exam will be given in class and will be 90 minutes in length. During the exam you will be allowed to use your notes, textbook, calculator, and STATA’s help menu. You will be asked to conduct statistical and econometric analyses using STATA and explain your findings. You will email your STATA log file to the instructor and the grader at the end of the exam.

• **Final Exam (40%)**: The final exam will be given on the last day of class and will be 120 minutes in length. The exam will be a comprehensive exam covering ALL material discussed throughout the course, including lecture slides, textbook and other reading material, in-class assignments and problem sets. During the exam you will be allowed to use your notes, textbook, calculator, and STATA’s help menu. You will email your STATA log file to the instructor and the grader at the end of the exam.

### Tentative Assignment and Test Dates

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Assigned</th>
<th>Due</th>
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</thead>
<tbody>
<tr>
<td>Problem Set #1</td>
<td>Aug 31, 2015</td>
<td>Sept 21, 2015</td>
</tr>
<tr>
<td>Problem Set #2</td>
<td>Sept 21, 2015</td>
<td>Oct 5, 2015</td>
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<tr>
<td>Midterm</td>
<td>-</td>
<td>Oct 26, 2015</td>
</tr>
<tr>
<td>Problem Set #4</td>
<td>Oct 19, 2015</td>
<td>Nov 2, 2015</td>
</tr>
<tr>
<td>Problem Set #5</td>
<td>Nov 9, 2015</td>
<td>Nov 23, 2015</td>
</tr>
<tr>
<td>Final Exam</td>
<td>-</td>
<td>Nov 23, 2015</td>
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• You may submit an assignment late, but you will lose 25% of credit for every day after the due date. Information about exams and class assignments can also be found on our class website at [http://elms.umd.edu/](http://elms.umd.edu/).
## Tentative Schedule and Topics

<table>
<thead>
<tr>
<th>#</th>
<th>Date</th>
<th>Topic</th>
<th>Assigned chapters</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aug 31</td>
<td>Data management chapters from Mitchell.</td>
<td>Cleaning data (Mitchell, Ch. 3), creation of variables (Mitchell, Ch. 5), appending and merging datasets (Mitchell, Ch. 6)</td>
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<tr>
<td>N/A</td>
<td>Sept 7</td>
<td>No Class – Labor Day.</td>
<td>N/A</td>
</tr>
<tr>
<td>2</td>
<td>Sept 14</td>
<td>Data management chapters from Mitchell.</td>
<td>Cleaning data (Mitchell, Ch. 3), creation of variables (Mitchell, Ch. 5), appending and merging datasets (Mitchell, Ch. 6)</td>
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<tr>
<td>3</td>
<td>Sept 21</td>
<td>Limited dependent variables I: probit/logit, maximum likelihood estimation</td>
<td>Ch 7.1, 7.5, 17.1</td>
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<tr>
<td>4</td>
<td>Sept 28</td>
<td>Limited dependent variables II: polychotomous dependent variables, including multinomial logit/probit, conditional logit, mixed logit, ordered probit</td>
<td>Kennedy, Greene, and Cameron and Trivedi (in that order) contain good readings on polychotomous models; topic not covered by Wooldridge</td>
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<tr>
<td>5</td>
<td>Oct 5</td>
<td>Poisson, censoring, truncation, Tobit</td>
<td>Ch 17.2 – 17.4</td>
</tr>
<tr>
<td>6</td>
<td>Oct 12</td>
<td>Endogeneity I: the flavors of endogeneity, applied examples</td>
<td>Ch 3.3, 9.4-9.5, 15.1, section 3.2 might also be helpful (includes the “partialing-out” interpretation that helps to understand OVB, 6.3 – 6.4 might also be helpful)</td>
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<tr>
<td>7</td>
<td>Oct 19</td>
<td>Endogeneity II: Instrumental variables</td>
<td>Ch 15.1-15.4</td>
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<tr>
<td>8</td>
<td>Oct 26</td>
<td>Midterm</td>
<td></td>
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<tr>
<td>9</td>
<td>Nov 2</td>
<td>Panel data I: fixed effects</td>
<td>Ch 13, 14.1</td>
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<tr>
<td>10</td>
<td>Nov 9</td>
<td>Panel data II: random effects; Simultaneous equations. Heteroskedasticity</td>
<td>Ch 14.1-14.3, Ch 16, Ch 8</td>
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<tr>
<td>11</td>
<td>Nov 16</td>
<td>Time series I</td>
<td>Ch 10 – 12</td>
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<tr>
<td>12</td>
<td>Nov 23</td>
<td>Final exam</td>
<td>N/A</td>
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### Statement of student-faculty interaction

Student attendance and participation during class time are essential for successfully completing this class. Instructor will be available either before or after class sessions for consultation and will provide virtual office hours (with online discussion rooms) between class meetings.

### Coursework and grading

Grades will be determined based on students’ participation in seminar discussion, performance on homework and exams (including a final comprehensive exam to be given during the 12th and final week of the term).
University of Maryland and Department of Economics Policies

Course Website: Copies of the course syllabus, your grades, and other relevant links and documents will be posted on the course’s ELMS/Canvas website. You can access the site via www.elms.umd.edu. You will need to use your University of Maryland “directory ID” and password.

Email: Email is the primary means of communication outside the classroom, and I will use it to inform you of important announcements. Students are responsible for updating their current email address via http://www.testudo.umd.edu/apps/saddr/ AND for paying attention to messages I send to the class via ELMS. Failure to check email, errors in forwarding email, and returned email due to “mailbox full” or “user unknown” will not excuse a student from missing announcements or deadlines. I will do my best to respond to email within 36 hours.

Contact Hours: Three credit courses at the University of Maryland require a minimum amount of contact between instructors and students. Our courses’ 12 weekly 3-hour meetings only satisfy 80% of the university’s contact requirement. The other 20% is usually satisfied by mandatory and graded online contact. Instructors have some discretion in how they structure the online component of their course. In principle, the contact hours requirement could also be satisfied by scheduling 3 additional 3-hour meetings per term, or one additional 45-minute meeting per week. The online components of our courses are a more flexible way to ensure that our program’s courses provide the same level of student-instructor contact as a traditional 15-week, face-to-face, 3-credit course at the University of Maryland.

Work Load: Mastering the material covered in this course requires a significant amount of work outside of class. Students should expect to spend more time outside of class than in class – typically at least twice as much time. The courses in our program are 12-week courses that cover all the same material as a traditional semester-long 3-credit course. The compressed schedule makes it possible to complete our degree in just 15 months if you take 2 courses each term. But the compressed schedule also implies an accelerated pace. If we’re going to cover all the same material as a traditional semester-long 3-credit masters-level course, we need to cover the material quickly.

Academic Integrity: The University of Maryland has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards applicable to all undergraduate and graduate students, and you are responsible for upholding these standards as you complete assignments and take exams in this course. Please make yourself aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information see www.studenthonorcouncil.umd.edu.

Student Conduct: Students are expected to treat each other with respect. Disruptive behavior of any kind will not be tolerated. Students who are unable to show civility to one another or myself will be referred to the Office of Student Conduct. You are expected to adhere to the Code of Student Conduct.
Medical Excuses: If you miss any class meetings for any reason, you are still responsible for all material covered during the meeting you missed. It is your responsibility – not the instructor’s – to get yourself caught up in the course.

If you need to miss an exam or other course deadline because of illness, injury, or some other emergency: Follow doctor’s orders and get documentation. Get in touch with the instructor as soon as you’re able – preferably prior to missing the exam or deadline. Communicate with the instructor to make up the course requirement as soon as possible. You are entitled to recover before you make up the course requirement, but you are not entitled to extra days to study beyond the time the doctor’s note says you’re incapacitated. If you are incapacitated for more than a week or so beyond the end of the term, your grade in the course will be an “Incomplete”. Once you make up the course requirement the instructor will change your "I" to the appropriate letter grade.

School Closings and Delays: Information regarding official University closing and delays can be found on the campus website and the snow phone line: (301) 405-SNOW (405-7669). Since our program is an evening program in downtown Washington, DC, rather than a day program in College Park, we do not always cancel classes on the same days as the College Park campus. The program director will always announce cancellation information to the program as an announcement on the program’s ELMS/Canvas site. This will generally be done by 1:00 p.m. on days when weather or other factors are an issue.

Students with Disabilities: The University of Maryland does not discriminate based on differences in age, race, ethnicity, sex, religion, disability, sexual orientation, class, political affiliation, and national origin. Reasonable accommodations will be made to students with documented disabilities. I will make every effort to accommodate students who are registered with the Disability Support Services (DSS) Office and who provide me with a University of Maryland DSS Accommodation form.

Academic Progress: The graduate school requires that students maintain a GPA of at least 3.0. Students whose cumulative GPA falls below 3.0 will be placed on academic probation by the graduate school. Students on academic probation must ask the program’s director to petition the graduate school if they want to remain in the program. The petition must include a plan for getting the student’s GPA up to at least 3.0. Students who do not live up to their plan can be forced to leave the program without having earned the degree.

Building Access: The door to the building at 1400 16th Street is unlocked on weekdays until 7:00 p.m. Students who arrive after 7:00 p.m. or on weekends will find the door locked. The building’s security guard is stationed at a desk just inside the door until 11:00 p.m. and will let you in. You can also call the phone on the security guard’s desk by dialing (202) 328-5158. If the security guard happens to be away from his or her desk when you arrive, you can pick up the black phone to the right of the door at 1400 16th Street. You will be connected to the company that handles security for our building. If you
tell them you are with the University of Maryland, they should ask you for a password. The password is “Drawbridge”. When you tell them the password, they will be able to unlock the door for you.

Courses that require students to do empirical work should include the following about Stata:

**Purchasing Stata:** Our program’s curriculum is designed to use Stata as the statistical software. Other leading statistical software packages include SAS and R. We have decided to focus on one package to enhance the continuity across courses in our program. A more superficial familiarity with multiple packages might be just as good as a deep understanding of a single package. But working with multiple packages would also result in less time to learn econometrics.

Students in our program should purchase Stata. Stata offers different "flavors" and different lengths of license. Price varies according to these two factors. A description of the flavors is given here:

http://www.stata.com/products/which-stata-is-right-for-me/

Stata offers student discounts via the "Gradplan":

http://www.stata.com/order/new/edu/gradplans/

The least expensive appropriate option is $75 for a 6-month license for “Stata IC”. A one-year license is $125, and a perpetual license (which never expires) is $198. We do not recommend “Small Stata”. Small Stata is too limited for the coursework our program.

Under the Gradplan, you may install Stata on up to three different computers. You may also eventually upgrade your version of Stata and your license, at a discount, if you wish.