Empirical Analysis III: Econometric Modeling and Forecasting

Syllabus

Instructor: Ye Zhang
Email: zhangye@umd.edu
Office Hours: Thursdays 5:30PM-6:15PM, or by email appointment

Teaching Assistant: Jared Scott Abramson
Email: jsabram@umd.edu
Office Hours: Saturdays 10:00AM - 10:45AM

Lectures and Sections

Each week there will be two synchronous online class meetings of 60 minutes each on Tuesdays, from 6:45pm to 7:45pm and then from 8:00pm to 9:00pm. There will also be asynchronous class content each week such as student presentations and online discussions.

Course Description

This is the third course in the three-course sequence "Empirical Analysis": ECON 643, ECON 644, and ECON 645. This is a course in applied econometrics, emphasizing the implementation of modern econometric methods to analyze concrete economic problems, including hands-on work applying these methods using STATA software. In particular, we will focus on the following topics: advanced panel data methods, methods of causal inference (including but not limited to instrumental variables, matching, difference-in-differences and regression discontinuity), limited dependent variable models, and sample selection correction models.

Our program has 7 general learning objectives:

1. **Ability to understand, evaluate and analyze economic data**
2. **Ability to understand and interpret statistical evidence from economic data**
3. **Ability to apply empirical evidence to assessing economic arguments**
4. Ability to apply macroeconomic theories to policy discussions
5. Ability to apply microeconomic theories to policy discussions
6. **Ability to communicate economic ideas to a broader audience**
7. **Ability to evaluate the effectiveness of policy programs using sound economic techniques**

The learning outcomes that pertain to this course are: 1, 2, 3, 6, and 7.

At the end of the course, you should be able to specify, identify, estimate and interpret your own econometric models for research questions, use STATA software for econometric and statistical analysis, and understand empirical papers in the field of economics.

Prerequisites

ECON 644

Textbooks and Software

The main required textbooks and software for the course are:

1) Stock, J., and M. Watson (SW), *Introduction to Econometrics*, (4^{th} Edition), Pearson, 2019.
2) Mitchell, M. (M), *Data Management Using STATA: A Practical Handbook*, (2^{nd} Edition), STATA Press, 2020.
3) STATA software, the last page of the syllabus provides detailed information on how to obtain STATA software.

Some optional textbooks, which are not required but which provides a complementary treatment that some students might find helpful:

1) Wooldridge, J., *Introductory Econometrics*, (7^{th} Edition), Cengage, 2019.
2) Cameron, A., and P. Trivedi, *Microeconometrics Using STATA, Revised Edition*, STATA Press, 2010.
3) Angrist, J., and J. Pischke, *Mastering Metrics: A Path From Cause to Effect*, Princeton University Press, 2015.
4) Angrist, J., and J. Pischke, *Mostly Harmless Econometrics: An Empiricist's Companion*, Princeton University Press, 2019.

There will be additional materials such as academic papers provided online via UMD ELMS.

Grading

Problem Set: 20% (best four out of five)
Midterm Exam: 25%
Final Exam: 40%

Paper Presentation: 10%
Online Discussion: 5%

Students' grades on each component of the course will be weighed according to the scale above to calculate their numerical course grade. The numerical course grades will be translated into letter grades as follows:

93 –100 ⇒ A | 90 – 92 ⇒ A-
89-80 ⇒ B+ | 70-79 ⇒ B | 60-69 ⇒ B-
50-59 ⇒ C+ | 40-49 ⇒ C | 30-39 ⇒ C-
20-29 ⇒ D+ | 10-19 ⇒ D | 0-9 ⇒ F

The grade A+ is reserved for the top student or two in the course (or maybe no one) at the instructor's discretion.

Problem Sets

The problem sets will consist of both theoretical and empirical questions. A typical problem set will ask you to solve theoretical problems, estimate econometric models, and discuss the results. Your grade for the empirical part of the problem sets will depend on both whether or not you in fact estimate what you are asked to estimate and get the correct answer, and on how well you interpret your results. Both are valuable (and marketable) skills. In my experience, interpretation is more difficult to learn. The theoretical part of the problem sets may require you to do some algebra or other similar calculations, or to explain the meaning of various statistical formulae.

As described in detail on the first page of each problem set, you must turn in both your clean and commented STATA log file and a completely separate set of answers to the problem set questions. The answers should consist of complete English sentences, possibly in addition to mathematical derivations or formulae and tables of your own creation. Generally, your problem sets should be typed. However, derivations and descriptive graphs may be done by hand. If you do this, you should scan your handwritten work and copy and paste into your main Word document. In my experience, neater and better organized problem sets receive higher grades, conditional on content. You are welcome to work together on the problem sets, but each student must turn in his or her own version of the assignment in their own words.

Problem sets should be turned in on ELMS. As you are allowed to drop your lowest problem set grade, no late problem sets will be accepted for any reason.

Paper Presentations

Each student needs to prepare a 20-minute presentation on a recent research article using the methods covered in the course. All students will be required to post preferred presentation topic during the initial online discussions in the first two weeks of the course, I will then assign papers

based on these preferences. The presentation should describe the paper, with bulk of the time focusing on the econometric method used in their "main" regression. The presentation should also include the critique of the technique used based on what we've covered in the course to that point. Student presentations will be asynchronous and the presentation video should be posted on ELMS based on the schedule below. You are required to submit a first draft of the presentation to me no later than 5PM the Thursday preceding your recorded asynchronous presentation due date. I will provide you with initial feedback which should be incorporated into your final presentation.

I encourage students to work in pairs, especially in the case of similar preference for topic areas. If you are working with a partner, you are still required to choose a separate paper to present, although they can be in the same topic area.

Online Discussions

We will have asynchronous discussions of the student presentations online. After the recorded student presentation is posted online, I will open several discussion threads related to that week's student presentation by 11:59 PM after class on the Tuesdays when a presentation is due. The presenters will have until 12:00 PM on Thursday to make initial replies to each thread of the online discussion. From noon on Thursday until noon on Friday, each other student in the class must make at least one contribution to any thread in the discussion, or open a new thread. From noon on Friday until noon on Saturday, each other student must make at least one additional contribution to the discussion. The second contribution must be in response to something posted by someone else.

I will check in twice a day between noon on Thursday and 11:30 AM on Saturday to read what's been posted, respond to some things, and redirect the discussion as necessary. Presenters are encouraged to participate as much as they like in the online discussion of their own presentation.

On the weeks during which there is no student presentation, I will post questions relevant to the course material by 11:59 PM after class. The discussion will be open until Friday 12:00 PM for you to comment and respond. I will check in twice a day to read what's been posted, respond to some things, and redirect the discussion as necessary.

Tentative Course Outline

Week	Date	Topics	Readings	Assignments
1	9/1/2020	Review of Multiple Regression and Omitted Variable Bias	SW Chapters 6 and 9; M Chapters 2 and 3	
2	9/8/2020	Instrumental Variables Regression I	SW Chapter 12; M Chapter 5	
3	9/15/2020	Instrumental Variables Regression II	SW Chapters 12, 13.4, 13.5, 13.6, and 13.7; M Chapter 5	PS1 Out
4	9/22/2020	Limited Dependent Variable Models	SW Chapter 11; M Chapter 6	PS1 Due; PS2 Out; Student Presentation Due
5	9/29/2020	Potential Outcome Framework, Treatment Effect Literature, and Matching Estimators	SW Chapter 13; Lecture Notes; M Chapter 6	
6	10/6/2020	Panel Data Models I	SW Chapter 10; M Chapter 7	PS2 Due; PS3 Out; Student Presentation Due
7	10/13/2020	Panel Data Models II and Midterm Review	SW Chapter 10; M Chapter 9	Student Presentation Due
8	10/20/2020	Midterm Exam (90 Minutes) and Difference in Differences I	SW Chapter 13; M Chapter 8	
9	10/27/2020	Midterm Exam Review		PS3 Due; PS4 Out; Student Presentation Due
10	11/3/2020	Difference in Differences II and Synthetic Control	SW Chapter 13; M Chapter 9	Student Presentation Due
11	11/10/2020	Regression Discontinuity Designs	SW Chapter 13; Lecture Notes	Student Presentation Due
12	11/17/2020	Time Series I	SW Chapter 15	PS4 Due; PS5 Out; Student Presentation Due
13	11/24/2020	Time Series II	SW Chapter 15	Student Presentation Due
14	12/1/2020	Course Review		PS5 Due
15	12/8/2020	Final Exam		
16	12/15/2020	Reading Day		
17	12/22/2020	Final Exam Make-Up (only if one of the earlier course meetings must be canceled due to unforeseen circumstances)		

University of Maryland 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: The University has adopted email as 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.registrar.umd.edu/current/` (Under the first major heading of "Online Transactions" there is a link to "Update Contact Information".)

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.

Academic Integrity: The University of Maryland, College Park has a nationally recognized Code of Academic Integrity. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit `http://www.studentconduct.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.

Excused Absences: The University of Maryland's policy on excused absences is posted here:

`http://www.president.umd.edu/administration/policies/section-v-student-affairs/v-100g`

Please note:

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. Instructors routinely facilitate things by posting lecture notes, etc.

If you need to miss an exam or other graded course requirement 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". In such cases

you must negotiate a plan with your instructor for completing the course requirements. 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). The program director will also announce cancellation information to the program as an announcement on the program's ELMS/Canvas site. This will generally be done by 1:00PM on days when weather or other factors are an issue. If classes need to be cancelled during the semester, it may be necessary to move the final exam back a week so missed classes can be made up.

UMD Counseling Center: Sometimes students experience academic, personal and/or emotional distress. The UMD Counseling Center in Shoemaker Hall provides comprehensive support services that promote personal, social, and academic success. The cost of these services is covered by the fees you already paid when you registered for classes, and there is no additional charge if you use the services. Proactively explore the range of services available, including the Counseling Service, Accessibility and Disability Service, Learning Assistance Service, and the Testing Office, all described at `http://www.counseling.umd.edu/`.

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, or national origin. Reasonable accommodations will be arranged for students with documented disabilities. Students who have an accommodations letter from the Accessibility and Disability Service (ADS) should meet with me during the first week of the semester to discuss and plan for the implementation of your accommodations. If you require reasonable accommodations but have not yet registered with ADS, please contact the Accessibility and Disability Service at 301-314-7682 or `adsfrontdesk@umd.edu`.

Academic Progress: The UMD 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 enrolled 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 have their enrollment in the program terminated without having earned the degree. Note: a grade of "B" corresponds to a GPA of 3.0. A grade of "B-" corresponds to a GPA of 2.7.

Laptop Computer Requirement: Completing some of this course's requirements will require a laptop computer (not a notebook or a tablet!) with at least 1 GB of RAM and at least 5 GB of free space available on the hard-drive. We recommend laptops with a 15-inch screen. Screens smaller than 13 inches are probably not practical.

STATA Purchasing Options: Students in our program must purchase STATA. STATA offers different "flavors" and different lengths of licensing. Price varies according to these two factors. We do not recommend Small STATA since it is too limited for the coursework in our program. STATA/IC is the least expensive and sufficient version for your coursework. With a single-user license, you can install STATA on up to three computers. Description of all the flavors are given

here:

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

The most cost-effective license duration is to purchase a perpetual license (which never expires). The student price for a perpetual STATA/IC license is $225. The student price for an annual license is $94, so more expensive if you end up using STATA for longer than 1 year – which you will do just to graduate from our program. Most of our graduates continue to use STATA even after they graduate, so the $225 perpetual license is worthwhile. Perpetual license holders are also entitled to discounted STATA upgrades in the future. Here is the link for student single-user purchase:

`https://www.stata.com/order/new/edu/gradplans/student-pricing/`

During the checkout process you will be asked to verify your student status. I believe this can be done by uploading a copy of your student ID, your tuition bill or statement, or verifying your "`@umd.edu`" email address.