ECON 645   *Spring Semester 2022*
Empirical Analysis III   *Department of Economics*
Master of Science in Applied Economics (Washington, DC Location)   *University of Maryland*

Empirical Analysis III: Econometric Modeling and Forecasting

Syllabus

Instructor: Ye Zhang
Email: `zhangye@umd.edu`
Office Hours: Tuesdays 6:00PM – 6:45PM, (Zoom) or by email appointment

Teaching Assistant: Jared Scott Abramson (starting 3/19/2022)
Email: `jsabram@umd.edu`
Office Hours: Saturdays 11:00AM – 11:45AM (Zoom)

Lectures and Sections

This is a "Mostly Online Section" with weekly synchronous online class meetings, but **in-person proctored exams.** Each week there will be two synchronous online class meetings of 60 minutes each on Monday, from 6:45PM to 7:45PM and then from 8:00PM to 9:00PM. Students are expected to participate in both synchronous online class meetings each week. There will also be asynchronous class content each week such as online discussions.

Mandatory In-Person Midterm and Final Exams

Students are required to sit for in-person proctored Midterm and Final exams. See the Course Outline for dates and times. These two exams will be the only in-person components of the course, and will be administered in our suite at 1400 16th St, NW in Washington, DC.

Course Description

This is the third course in the three-course sequence "Empirical Analysis" and 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 time series 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

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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*, (4th Edition), Pearson, 2019.

2) Mitchell, M. (M), *Data Management Using STATA: A Practical Handbook*, (2nd 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*, (7th 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%
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 $\Rightarrow$ A | 90 – 92 $\Rightarrow$ A-
89-80 $\Rightarrow$ B+ | 70-79 $\Rightarrow$ B | 60-69 $\Rightarrow$ B-
50-59 $\Rightarrow$ C+ | 40-49 $\Rightarrow$ C | 30-39 $\Rightarrow$ C-
20-29 $\Rightarrow$ D+ | 10-19 $\Rightarrow$ D | 0-9 $\Rightarrow$ 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.

Paper Presentations

Each student will be assigned to a team of two and each team needs to prepare a 20-minute

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presentation on a recent research article using the methods covered in the course. I will provide the list of research papers for all teams to select and each team is required to make the paper selection in the first two weeks of the course. 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. You are required to submit a first draft of the presentation to me no later than 5PM the Thursday preceding your presentation date. I will provide you with initial feedback which should be incorporated into your final presentation.

Online Discussions

We will also have asynchronous discussions of the student presentations online. After the student presentation, I will open several discussion threads related to that week's student presentation by 11:59 PM Tuesday after the presentation date. 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 Saturday, 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 Saturday until noon on Monday, 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 at least once a day 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 Tuesday after class. The discussion will be open until Sunday 12:00 PM for you to comment and respond. I will check in once a day to read what's been posted, respond to some things, and redirect the discussion as necessary.

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Course Outline

Week	Date	Topics	Readings	Assignments
1	2/28/2022	Review of Multiple Regression and Omitted Variable Bias	SW Chapters 6 and 9; M Chapters 2 and 3	
2	3/7/2022	Instrumental Variables Regression I	SW Chapter 12; M Chapter 5	
3	3/14/2022	Instrumental Variables Regression II	SW Chapters 12, 13.4, 13.5, 13.6, and 13.7; M Chapter 5	PS1 Out
4	**3/18/2022**	Limited Dependent Variable Models	SW Chapter 11; M Chapter 6	PS2 Out
5	3/28/2022	Potential Outcome Framework, Treatment Effect Literature, and Matching Estimators	SW Chapter 13; Lecture Notes; M Chapter 6	PS1 and PS2 Due; Student Presentations
6	4/4/2022	Panel Data Models I	SW Chapter 10; M Chapter 7	Student Presentations
7	**4/11/2022**	Midterm Exam		**6:45PM to 8:45PM**
8	4/18/2022	Panel Data Models II	SW Chapter 10; M Chapter 9	PS3 Out; Student Presentations
9	4/25/2022	Difference in Differences	SW Chapter 13; M Chapters 8 and 9	PS3 Due; PS4 Out; Student Presentations
10	5/2/2022	Regression Discontinuity Designs	SW Chapter 13; Lecture Notes	Student Presentations
11	5/9/2022	Time Series	SW Chapter 15	PS4 Due; Student Presentations
12	**5/16/2022**	Final Exam		**6:45PM to 8:45PM**

Note: There will be no class meeting on Monday 3/21 (Spring Break), instead we will meet on Friday 3/18..

University of Maryland Policies

Policies related to all graduate courses at the University of Maryland are posted on this page of the Graduate School's website:

`https://gradschool.umd.edu/faculty-and-staff/course-related-policies`

Please familiarize yourself with these policies related academic integrity, non-discrimination policy, accessibility, absences and accommodations, grading, academic standing, grievance procedures, and other important policies.

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. The University creates an "`@umd.edu`" email address for every graduate student. All official UMD communications will be sent to students at their "`@umd.edu`" email address. You are responsible for reading your `@umd.edu` email address, including ELMS Announcements I send to the class. You should make sure ELMS Announcements and messages are forwarded to an email address that you check regularly. 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.

Course Website: Copies of the course syllabus, student's grades, and other relevant links and documents will be posted on the course's ELMS website. Students can access the site via `www.elms.umd.edu`. They will need to use their University of Maryland "directory ID" and password.

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 DC program are 12-week courses that cover all the same material as a traditional semester-long 3-credit course (15 weeks). The compressed schedule makes it possible to complete our degree in just 15 months if you take two courses each term. But the compressed schedule also implies an accelerated pace with an average of 25% more work per week in a given course $(15/12 = 1.25)$. The normal full-time load in a master's program is 3 courses per semester, or 6 courses per year. The weekly workload when taking 2 of our DC courses per term is equivalent to the load from 2.5 "normal" 15-week courses–so 2.5/3.0=83% of a full-time load. However, the DC program takes just 1 week off between terms. Students who take 2 courses per quarter in our program complete 8 courses per year. So over the course of a year, taking 2 courses per quarter in our DC program is equivalent to 133% of a "normal" full-time load in the traditional semester-based program $(8/6 = 1.33)$.

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. Note: a grade of "B" corresponds to a GPA of 3.0. A grade of "B-" corresponds to a GPA of 2.7.

Excused Absences: If you miss any class meetings for any reason, it is your responsibility to work with the instructor to make sure you catch up on the missed material. 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 site. This will generally be done by 1:00PM on days when weather or other factors are an issue. When classes need to be canceled during the semester, we make every effort to schedule makeup classes.

UMD Counseling Center: Sometimes students experience academic, personal and/or emotional distress. The UMD Counseling Center in Shoemaker Hall provides free, comprehensive, and confidential counseling/mental health services that promote personal, social, and academic success. All Counseling Center services are completely free for enrolled students. Proactively explore the range of services available at the Counseling Center, including the Counseling Service and Accessibility and Disability Service described at `http://www.counseling.umd.edu/`

Graduate Academic Counselor: The UMD Graduate School also has an academic counselor available to support students who are having difficulty navigating mental health resources on campus, are considering a leave of absence and/or need assistance finding mental health care off campus. The Graduate Academic Counselor also facilitates bi-weekly Graduate Student Circle Sessions which provide an opportunity to learn about resources and connect with other graduate students. Students can learn more about the Graduate Academic Counselor by going to: `https://gradschool.umd.edu/gradcounselor`

Course Evaluations: Near the end of the term, you will receive an email inviting you to submit a voluntary and anonymous course evaluation. Your feedback on courses will be very helpful in improving the quality of instruction in our program.

Building Access: There is a smartphone app that can be used to enter our building after normal business hours. The program coordinator will provide information about this. We will also

provide information about the code for entering the front door of our suite. Please make sure you are receiving the ELMS Announcements that we send out to the program about these and other important matters.

COVID Policies: Up-to date information about UMD COVID-19 policies and guidance are posted at

`https://umd.edu/4Maryland`

Given the evolving nature of the pandemic, the guidance and polices are subject to change. The plans are always coordinated with state and county health officials, with additional guidance provided by the University System of Maryland. The focus will always be on the health and well-being of our entire campus community.

We strongly urge all students, staff and faculty to read announcements they receive about COVID related guidance and policy, and to stay familiar with the information. We thank you all for your individual efforts to help protect the collective health of our entire community.

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.