

ECON 470: ECONOMETRICS

Lloyd Page

Summer II, 2024

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Office Hours: M-F 1:15pm-2:15pm

Office: Swain 203A

Web: <https://uncch.instructure.com/courses/60935>

Class Hours: M-F 11:30am-1pm

Class Room: Gardner Hall 209

Course Description

Econometrics is the application of statistical methods and economic theory to the problem of identifying, estimating, and testing economic models. This course covers concepts and methods used in empirical economic research. Students will learn how to conduct and how to critique empirical studies in economics.

Available Materials

- Recommended Textbook: "Introductory Econometrics: A Modern Approach" by Jeffrey Wooldridge
- Everything else will be provided in Canvas.
- Recommended Programming language: Stata via virtual lab/university computer labs
- Recommended Report Writing Software: Latex via overleaf

Prerequisites

Prerequisites: ECON 400 and 410 with a grade of C or better in both courses

Course Objectives

Successful students:

1. Study and understand the properties and limitations of regressions, especially in respect to causality

2. Learn to interpret, comprehend, and communicate the magnitude, direction, economic significance, and statistical significance of econometric results.
3. Learn to select the best tool for the data they are analyzing and explain why they chose said tool
4. Study and understand the properties and limitations of casual methods and their associated econometric analyses
5. Develop their skills in data handling and programming by cleaning data, generating estimates, and writing script files

Schedule and weekly learning goals

The schedule is tentative and subject to change. The learning goals below should be viewed as the key concepts you should grasp after each week, and also as a study guide.

Week 01, 06/24 - 06/28: Simple Regressions, Heteroskedasticity

- Understand the definition of the simple regression model
- Be able to derive the OLS estimator
- Understand the properties and limitations of the OLS estimator
- Understand how heteroskedasticity impacts OLS estimation

Week 02, 07/01 - 07/05: Multiple regressions

- Understand the properties and limitations of multiple regression estimation and inference

Week 03, 07/08 - 07/12: Asymptotics, Model Selection, Dummy Variables, **Midterm on July 12th in Class**

- Understand the asymptotic efficiency, normality, and consistency of OLS
- Understand how model selection and data transformations impact the Estimation and Inference of regression models
- Understand how to incorporate dummy variables into a multiple regression models and their associated properties and limitations

Week 04, 07/15 - 07/19: Specification, Panel Data Methods

- Understand how specification and data issues impact the validity of approaches.
- Understand how to deal with panel data, both using difference-in-difference methods and fixed effects methods

Week 05, 07/22 - 07/26: Instrument Variables, Simultaneous Equation Models

- Understand the situations in which instrument variables and the associated 2SLS approach are valid, the properties of such an approach, and the limitations of said approach
- Understand the properties and limitations of the simultaneous equation model.

Week 06, 07/29 - 08/02: Final Exam on July 29th from 11:30am-2:30pm

Course Structure

Class Structure

This course will be a lecture driven course. That being said, you should ask any and all questions you have. Sufficient participation may result in bonus points being rewarded at the end of the semester. I reserve the right to determine how many bonus points and to whom they are rewarded and what they are rewarded for. It is highly recommended that you pay attention in class and take notes by hand (either in a notebook or on a tablet), research has shown that students perform best when doing so.

Assignments

Assignments will be assigned weekly. They are due Friday at midnight by email to me. There will be a minor grace period dependent on when I wake up on Saturday to start grading, but once I start grading all submissions will be closed. Any submission made in this grace period will automatically lose 10 points. Each assignment will consist of a written portion and a coding portion. Collaboration is encouraged, but your submissions must be your own. Copy-pasting solutions from other students is not allowed. Answer keys will be provided in the form of a pdf for the written portion and Stata for the coding portion. As such, it is recommended that you write your code in Stata. That being said, I will also allow R and Python. If you wish to use something else, please check with me before using it.

Midterm Exam

There will be a midterm exam on Friday, July 12th. If you need various support resources please contact the appropriate people before this date. If you miss the exam for some reason, you need to contact me by email before the exam starts to avoid getting a 0. In such an instance, we will discuss how you will makeup the missing exam.

Final Exam

The final exam for this course will be held on Monday, July 29th from 11:30am-2:30pm. If you need various support resources please contact the appropriate people before this date. If you miss the exam for some reason, you need to contact me by email before the exam starts to avoid getting a 0. In such an instance, we will discuss how you will makeup the missing exam.

Grading Policy

I reserve the right to curve grades dependent on overall class scores at the end of the semester. Any curve will only ever make it easier to obtain a certain letter grade. The final grade will consist of the following proportions:

- 30% of your grade will be determined by the final exam.
- 20% of your grade will be determined by the midterm.
- 50% of your grade will be determined by the assignments (10% each)

The default grades are as follows:

A:[93,100]	A-:[90,93)	B+:[87,90)
B:[83,87)	B-:[80,83)	C+:[77,80)
C:[73,77)	C-:[70,73)	D+:[67,70)
D:[60,67)	F:[0,60)	

Course Policies

During Class

I understand that the electronic recording of notes will be important for class and so computers and tablets will be allowed in class. Please refrain from using computers and tablets for anything but activities related to the class. Phones are prohibited as they are rarely useful for anything in the course. Eating and drinking are allowed in class but please refrain from it affecting the course.

Attendance Policy

University Policy: As stated in the University's Class Attendance Policy, no right or privilege exists that permits a student to be absent from any class meetings, except for these University Approved Absences. To find out more check this link: <https://catalog.unc.edu/policies-procedures/attendance-grading-examination/>

Honor Code

All students are expected to follow the guidelines of the UNC honor code. In particular, students are expected to refrain from "lying, cheating, or stealing" in the academic context. If you are unsure about which actions violate that honor code, please consult honor.unc.edu

Artificial Intelligence (AI) Use Policy

Use of generative AI tools of any kind is not permitted in this course. Any use of these tools will be considered an instance of academic dishonesty and will be referred to the Honor System. While you may be able to use AI tools in an industry setting, the point of this course is to learn how to implement various statistical algorithms yourself, not learn how to be a AI prompt generator.

Syllabus Changes

The instructor reserves the right to make changes to the syllabus including project due dates and test dates. These changes will be announced as early as possible.

Acceptable Use Policy

By attending the University of North Carolina at Chapel Hill, you agree to abide by the University of North Carolina at Chapel Hill policies related to the acceptable use of IT systems and services. The Acceptable Use Policy (AUP) sets the expectation that you will use the University's technology resources responsibly, consistent with the University's mission. For more information check out:

<https://policies.unc.edu/TDClient/2833/Portal/KB/ArticleDet?ID=131247>

Late Submission Policy

As stated above, assignments are due Friday at midnight by email to me. There will be a minor grace period dependent on when I wake up on Saturday to start grading, but once I start grading all submissions will be closed. Any submission made in this grace period will automatically lose 10 points.

Date Security and Privacy

UNC-Chapel Hill is committed to fulfilling its responsibilities of transparency as a state-sponsored institution of higher learning, protecting certain types of information, and using information Carolina collects only for appropriate purposes. For more information check out: <https://www.unc.edu/about/privacy-statement/>

Grade Appeal Policy

If you have any concerns with grading and/or feel you have been awarded an incorrect grade, please discuss it with me as soon as possible. If we cannot resolve the issue, you may talk to our director of undergraduate studies or department chair

Accessibility Resources and Service

Accessibility Resources and Service (ARS – ars@unc.edu) receives requests for accommodations, and through the Student and Applicant Accommodations Policy determines eligibility and identifies reasonable accommodations for students with disabilities and/or chronic medical conditions to mitigate or remove the barriers experienced in accessing University courses, programs and activities.

ARS also offers its Testing Center resources to students and instructors to facilitate the implementation of testing accommodations.

Counseling and Psychological Resources

UNC-Chapel Hill is strongly committed to addressing the mental health needs of a diverse student body. The Heels Care Network website (<https://care.unc.edu/>) is a place to access the many mental health resources at Carolina. CAPS is the primary mental health provider for students, offering timely access to consultation and connection to clinically appropriate services. Go to their website <https://caps.unc.edu/> or visit their facilities on the third floor of the Campus Health building for an initial evaluation to learn more. Students can also call CAPS 24/7 at 919-966-3658 for immediate assistance.

Title IX Resources

Any student who is impacted by discrimination, harassment, interpersonal (relationship) violence, sexual violence, sexual exploitation, or stalking is encouraged to seek resources on campus or in the community. Reports can be made online to the EOC at <https://eoc.unc.edu/report-an-incident/> or by contacting the University's Title IX Coordinator (Elizabeth Hall, titleixcoordinator@unc.edu) or the Report and Response Coordinators in the Equal Opportunity and Compliance Office (reportandresponse@unc.edu). Confidential resources include Counseling and Psychological Services and the Gender Violence Services Coordinators (gvsc@unc.edu). Additional resources are available at safe.unc.edu

Policy on Non-Discrimination

The University is committed to providing an inclusive and welcoming environment for all members of our community and to ensuring that educational and employment decisions are based on individuals' abilities and qualifications. Consistent with this principle and applicable laws, the University's Policy Statement on Non-Discrimination (<https://eoc.unc.edu/our-policies/policy-statement-on-non-discrimination/>) offers access to its educational programs and activities as well as employment terms and conditions without respect to race, color, gender, national origin, age, religion, genetic information, disability, veteran's status, sexual orientation, gender identity or gender expression. Such a policy ensures that only relevant factors are considered, and that equitable and consistent standards of conduct and performance are applied.

If you are experiencing harassment or discrimination, you can seek assistance and file a report through the Report and Response Coordinators (email reportandresponse@unc.edu or see additional contact info at safe.unc.edu) or the Equal Opportunity and Compliance Office at <https://eoc.unc.edu/report-an-incident/>.

Diversity Statement

I value the perspectives of individuals from all backgrounds reflecting the diversity of our students. I broadly define diversity to include race, gender identity, national origin, ethnicity, religion, social class, age, sexual orientation, political background, and physical and learning ability. I strive to make this classroom an inclusive space for all students. Please let me know if there is anything I can do to improve. I appreciate any suggestions.

Undergraduate Testing Center

The College of Arts and Sciences provides a secure, proctored environment in which exams can be taken. The Center works with instructors to proctor exams for their undergraduate students who are not registered with ARS and who do not need testing accommodations as provided by ARS. In other words, the Center provides a proctored testing environment for students who are unable to take an exam at the normally scheduled time (with pre-arrangement by your instructor). For more information, visit <http://testingcenter.web.unc.edu/>.

Learning Center

Visit UNC's Learning Center at <http://learningcenter.unc.edu> to make an appointment or register for an event. Their free, popular programs will help you optimize your academic performance. Try academic coaching, peer tutoring, STEM support, ADHD/LD services, workshops and study camps, or review tips and tools available on the website.

Writing Center

For free feedback on any course writing projects, check out UNC's Writing Center. Writing Center coaches can assist with any writing project, including multimedia projects and application essays, at any stage of the writing process. You don't even need a draft to come visit. To schedule a 45-minute appointment, review quick tips, or request written feedback online, visit <http://writingcenter.unc.edu>.

IDEAs in Action curriculum learning outcomes

Focus Capacity : Quantative Reasoning

Learning Outcomes These are the learning outcomes that are expected of students after completing a course.

- Summarize, interpret, and present quantitative data in mathematical forms, such as graphs, diagrams, tables, or mathematical text.
- Develop or compute representations of data using mathematical forms or equations as models, and use statistical methods to assess their validity.
- Make and evaluate important assumptions in the estimation, modeling, and analysis of data, and recognize the limitations of the results.
- Apply mathematical concepts, data, procedures, and solutions to make judgments and draw conclusions.
- Synthesize and present quantitative data to others to explain findings or to provide quantitative evidence in support of a position.

Questions for Students These are the types of questions you should be able to answer after completing a course.

- What is the role of mathematics in organizing and interpreting measurements of the world?
- How can mathematical models and quantitative analysis be used to summarize or synthesize data into knowledge and predictions?
- What methodology can we apply to validate or reject mathematical models or to express our degree of confidence in them?