ECON 514 - Econometric Analysis
Fall - 2020

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Class Website: https://canvas.emich.edu/
Class: Tuesdays from 6:30-9:10 p.m. (Zoom)
Office Hours: By appointment via Zoom

"If applied econometrics were easy, theorists would do it."
-From Mostly Harmless Econometrics by Angrist and Pischke

Description

Econometrics is the branch economics that uses data to analyze economic relationships. Most economic data is observational data that comes from uncontrolled social experiments that take place every day in the economy. Econometrics differs from classical statistics because the latter focuses on analyzing data that come from controlled experiments. The purpose of this course is to introduce you to the body of statistical methods used to analyze observational data and illustrate how these methods are applied in empirical research in economics. The focus of this class is on the development and application of the classical linear regression model. If time permits, other regression models will be introduced, such as the general linear regression model, fixed-effects regression model, and instrumental variables regression model. You will learn methods for estimating and testing hypotheses about the parameters of regression models, as well as a basic understanding of model specification issues. The emphasis of this class is on practical application and computer implementation. To implement the methods and techniques covered in lecture, you will learn how to use the R statistical software package to analyze real world data sets. R is a computer program that can be used to read, manage, analyze, and present data. It is widely used in academics and commercial establishments.

Prerequisites: ECON 201, ECON 202, and ECON 310, or equivalent

Textbook

Wooldridge, Jeffrey, Introduction to Econometrics: A Modern Approach, Cengage Learning.

This books is currently in its 7th edition; however, previous editions will work for this course. Other good references include:

Stock, J.H. and Watson, M.W. Introduction to Econometrics. Boston: Addison Wesley.

Kennedy, P. A. Guide to Econometrics. MIT press.

Required Statistical Software

In this course we will use the statistical software package R. R is a free software environment for statistical computing and graphics. It compiles and runs on a wide variety of UNIX platforms, Windows and MacOS. For instructions on how to install R and use R consult the R self-help guide posted on Canvas. Be sure to install R and R Studio on your personal computer before the first day of class. R (and R Studio) is installed on all the computers in the computer lab located in room 717 of Pray-Harrold. A teaching guide for the R statistical package, and data sets that accompany the R teaching guide can be downloaded from Canvas. A good online resource for using R is https://stats.idre.ucla.edu/r/.

Lectures

This is a hybrid course with remote synchronous instruction. All the lecture notes and data sets will be posted on Canvas 24 hours before the start of class. Lectures will be virtual and presented using Zoom. Zoom is a virtual meeting tool that allows for synchronous (real-time) online class instruction. All EMU enrolled students have licensed access to Zoom and can host or join meetings from anywhere; all you need is an Internet connection and a Windows computer, Mac computer, Android device or IOS device. Scheduling a virtual session is also easy given its integration with Google Calendar.

For more information about Zoom click the following links:

https://www.emich.edu/it/services/zoom/zoom.php

https://blog.zoom.us/category/how-tos/

https://www.youtube.com/user/ZoomMeetings/videos

https://support.zoom.us/hc/en-us/articles/206618765-Zoom-video-tutorials

Lectures are scheduled for Tuesdays from 6:30 p.m. until 9:10 p.m. While attendance is not mandatory you will be able to ask questions in real-time if you participate. Nevertheless, the lectures will be recorded and posted on Canvas for your convenience. Zoom meeting details will be posted on Canvas. For other information on f2f and hybrid classes Click Here.

Evaluation Criteria

Your grade will be based on a midterm exam (30%), final exam (30%), problem sets (15%), and a empirical research project (25%). The grading scale for the course is as follows:

A.....93-100%	B+.....86-89%	C+.....76-79%	F.....0-69%
A-.....90-92%	B.....83-85%	C.....73-75%	
	B-.....80-82%	C-.....70-72%	

Exams

There will one midterm exam and one final exam. The final exam is not comprehensive and will cover the material succeeding the midterm. The exams will cover materials from lectures. The exams will include short- and long-answer questions, and require you to analyze data using R. In addition to the answers to the exam questions, you will be required to turn in your R script file. Tentative dates for the exams will be given in class.

Problem Sets

There will be approximately one problem set assigned for each lecture. These will be posted on Canvas together with the data needed for the assignment. Problem sets usually consists of questions that require data analysis using R. R is installed on all the computers in the computer lab located in room 717 of Pray-Harrold. You can also download a copy of R on your personal computer. Note that you must turn in your own problem set (no copying!). Evidence that students copied assignments from other classmates will result in a zero for that assignment for all students involved. Answers to problem sets will be uploaded to Canvas after the due date. No late assignments will be accepted. Problem sets are graded on an all or nothing basis. This means that you must attempt EVERY question to receive credit, otherwise you receive a zero for the problem set.

Empirical Research Project

The empirical research project is an empirical study that uses data to analyze one or more economic relationships related to a topic in which you are interested. The objective of the study is to explain the relationship(s) between two or more economic variables. Details of this project are provided on the last page of the syllabus. The paper has no required length. It will be graded on quality not quantity. I will provide some data sets that you can use, otherwise you are welcome to use your own data set. You are required to submit a one page description of your topic, economic relationship(s) the data source, no later than Friday, October 23 by 11:59 p.m. on Canvas. The final paper and R script file are due no later than Friday, November 20 by 11:59 p.m. pm Canvas. Details of this research paper are on the last page of the syllabus.

Classroom Conduct

Any successful learning experience requires mutual respect. Neither instructor nor student should be subject to behavior that is rude, disruptive, intimidating, or demeaning. Views may differ on what counts as rudeness or courtesy. If you are not sure what constitutes good conduct in this classroom, ask the instructor. The instructor has primary responsibility for and control over classroom behavior and maintenance of academic integrity.

Students are expected to adhere to the standards and expectations detailed in the Student Code of Conduct. Academic dishonesty will not be tolerated. If you are caught cheating I will give you a zero for that assignment/exam and if the problem persists I will take further action.

University Policies

In addition to the articulated course specific policies and expectations, students are responsible for understanding all applicable University guidelines, policies, and procedures. For COVID-19 related safety measures (Click Here). The EMU Student Handbook is the primary resource provided to students to ensure that they have access to all University policies, support resources, and students' rights and responsibilities. Changes may be made to the EMU Student Handbook whenever necessary, and shall be effective immediately, and/or as of the date on which a policy is formally adopted, and/or on the date specified in the amendment. Please note: Electing not to access the link provided below does not absolve a student of responsibility.

For questions about any university policy, procedure, practice, or resource, please contact the Office of the Ombuds: 248 Student Center, (734) 487-0074, emu_ombuds@emich.edu, or visit the website: http://www.emich.edu/ombuds

University course policies link: http://www.emich.edu/studenthandbook/policies/academic.phpuniv

Disability Concerns

It is my goal that this class be an accessible and welcoming experience for all students, including those with disabilities that may affect their learning in this class. If you believe you may have trouble participating or effectively demonstrating learning in this course, please meet with me (with or without an accommodation letter from the Disability Resource Center) to discuss reasonable options or adjustments. During our discussion, I may suggest the possibility/necessity of your contacting the DRC (240 Student Center; (734) 487-2470; swd_office@emich.edu) to talk about academic accommodations. You are welcome to talk to me at any point in the semester about such issues, but it is best if we can talk at least one week prior to the need for any modifications.

University Writing Center

The University Writing Center Virtual (UWCV) offers writing support to all undergraduate and graduate students. In doing so, we value the diversity of our campus and honor all students and the languages they bring with them to the university.

University Library

Research support is available to all students, 24/7. This includes getting started with research, identifying sources to search, developing search strategies, evaluating resources, and more. See https://www.emich.edu/library/help/ask.php for all of the ways in which you can get help with research. Some University Library services have changed, and may continue to change, in response to the pandemic.

Please check for current information at https://www.emich.edu/library/news/covid.php.

The Academic Projects Center (116 Halle Library) also offers one-to-one writing consulting for students, in addition to consulting on research and technology-related issues. Additional information about the APC can be found at https://www.emich.edu/apc.

Holman Success Center

The Holman Success Center provides Academic Support through a variety of virtual and in-person services.

International Student Resource Center

International Student Resource Center (200 Alexander Building) is a service of the World Languages Department for EMU students who need help with their non-native English language for academic assignments. Help is provided for reading and comprehension, listening and note-taking, improvement of grammatical accuracy, compositions, study skills, and conversation. Note, this is not the Office of International Students.

Student and Exchange Visitor Statement (SEVIS)

The Student Exchange Visitor Information System (SEVIS) requires F and J students to report numerous items to the Office of International Students & Scholars (OISS))

Title IX

Title IX of the Education Amendments of 1972 prohibits discrimination on the basis of sex under any education program or activity receiving federal financial aid. Sexual assault and sexual harassment is a form of sex discrimination prohibited by Title IX. What you need to know about Title IX

Tentative Topics to be Covered

1. Introduction to Econometric analysis (Chapter 1)

2. Fundamentals of Probability (Appendix B)

3. Fundamentals of Mathematical Statistics (Appendix C)

4. The Simple Regression Model (Chapter 2)

Midterm Exam

5. Multiple Regression Analysis: Estimation (Chapter 3)

6. Multiple Regression Analysis: Inference (Chapter 4)

7. Multiple Regression Analysis: OLS Asymptotics (Chapter 5)

8. Multiple Regression Analysis: Further Issues (Chapter 6)

9. Multiple Regression Analysis with Qualitative Information (Chapter 7)

10. Heteroskedasticity (Chapter 8)

Final Exam, Tuesday, December 15

*This syllabus is subject to change. If I do make changes, I will email the revised syllabus and announce them in class.

Empirical Research Project

The main objective of this empirical research project is to apply the econometric skills and knowledge from this course, together with your knowledge of economic theory, to a real world application of your choice. Your first task is to decide on a research question. You may want to start with a data set and then decide on the research question. You can collect your own data or use the data sets that I provide to you. Next, you want to describe the economic relationship between variable X in the data set and variable Y. In particular, you should be able to use economic logic to make an argument for why variable X causes variable Y. This will be your thesis or testable hypothesis, that you will test empirically using regression analysis. Chapter 19 "Carrying out an Empirical Project" in the textbook is a good resource for learning how to conduct an empirical paper.

Your first assignment is to submit a one page proposal. The proposal should include your research question, the economic relationship(s), and the data source(s). This is due on Canvas no later than **Friday, October 23rd by 11:59 p.m.**

The final paper is due on **Friday, November 20th by 11:59 p.m.** Canvas. In addition to the final paper you will also turn in your R script file and data files so that I can replicate your results. The paper must include the following information with the correct section headings:

1. **Title Page:** include the title of your paper, your name, "Paper prepared under Dr. Saunoris as partial fulfillment of requirements for Economics 515: Econometric Analysis II", date, abstract of 100 words or less summarizing paper.

2. **Introduction:** A brief introduction that identifies the research question being addressed, why the topic is important, and a preview of your results.

3. **Data and Descriptive Statistics:** A detailed discussion and description of the data used (be sure it is a cross-sectional data set), and the sample covered by the data, units of measure for each variable, level versus change form, and key descriptive statistics (mean, median, standard deviation, and minimum and maximum value, plus Pearson correlation coefficients among your dependent and independent variables).

4. **Econometric model:** This section should include your econometric specification, the estimation technique used to estimate the parameters of the model, The hypothesis you are going to test, and expectations for the sign of the other coefficients. You should also include the theory driving your hypothesis. In other words, why does X cause Y? This may require a formal mathematical model or you may use economic logic to argue why X causes Y.

5. **Results:** The results section should include a table of your results. Note these results should NOT be copy and pasted from R–See Chapter 19 in textbook for a sample of a table. This section will also include an explanation and discussion of econometric results. In your discussion include: a discussion of the sign and (economic and statistical) significance for each explanatory variable; interpret each coefficients in the model; and explain any goodness-of-fit measures. You should also include in this section any pre-testing and diagnostic tests that were conducted. Discuss the possible econometric problems associated with your results, such as model misspecification, non-linearity, endogeneity, omitted variable bias, multicollinearity, heteroskedasticity, and/or autocorrelation. While some of these you should fix (e.g. heteroskedasticity, OVB, and model misspecification), other problems you can just discuss (e.g. endogeneity).

6. **Conclusion:** What was your topic and research question, what were the results of your empirical analysis, what are the policy implications, and what potential extensions?