ECON 515 - Econometric Analysis II
Winter - 2020

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Class Website: https://canvas.emich.edu/
Class: Wednesday 6:30-9:10 p.m.
Office Hours: Monday & Wednesday 11:00 a.m.-2:00 p.m.
and by appointment

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

"...we should listen to the data, but know when to tell the data to shut up!"
-Peter Kennedy, "Oh No! I Got the Wrong Sign! What Should I Do?", *Journal of Economic Education*, 2005.

Description

The purpose of this course is to expose you to advanced econometric methods. The focus of the class is on five types of statistical models: classical and general linear regression models, binary discrete choice regression models, panel data regression models, regression models involving systems of equations, and time-series models. You will learn methods for estimating and testing hypotheses about the parameters of these models, as well as a basic understanding of model specification issues. The emphasis of this class is on the practical application of econometrics, and understanding the important relationship between economic theory and statistical models in empirical research involving economic phenomena.

Prerequisites: ECON 415, or equivalent

Textbook

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

Supplemental Material

All the lecture notes will be posted on Canvas 24 hours before the start of class. 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 http://www.ats.ucla.edu/stat/sas/. Canvas will also include other information including the syllabus, problem sets, answer keys, data sets, and handouts.

Other Good References:

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

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

R 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. R (and R Studio) is installed on all the computers in the computer lab located in room 717 of Pray-Harrold..

Grading

Your grade will be based on a midterm exam (30%), final exam (30%), problem sets (10%), and a empirical research paper (30%). 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 lecture, textbook, and problem sets. Each exam will consists of an in-class and out-of-class component. The exams will include short and long answer questions, and require you to analyze data. 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 Paper

The paper 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. The paper should include five sections: (1) Introduction; (2) Data and descriptive statistics; (3) Econometric model; (4) Results; (5) Conclusions. The Introduction should discuss the economic relationship(s) and the specific objective of your study. The Data and Descriptive Statistics section should discuss your data source(s), variables, and descriptive statistics. The Econometric model section should discuss the specification of your econometric model and the approach you will take to estimate the parameters and test meaningful hypotheses. The Results section should discuss the estimates of the parameters of your model and the results of hypothesis tests. The Conclusions section should discuss what you have learned from using data to analyze the

economic relationship(s) of interest. The paper has no required length. It will be graded on quality not quantity. You are required to submit a one page description of your topic, economic relationship(s) the data source, and an electronic copy of the data set no later than Wednesday, March 11 by 11:59 p.m. on Canvas. The paper and R script file are due no later than Wednesday, April 8 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. In addition, cell phones, side conversations, tardiness, foul language, and the use of open laptops and ipads/tablets for purposes other than for class will not be tolerated. These are very disruptive to students and if the problem persists I will ask you to leave. 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.

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.

Enhancing Student Skills

The University Writing Center (115 Halle Library; 487-0694) offers one-to-one writing consulting for undergraduate and graduate students. The UWC also has several satellite locations across campus (in Owen, Marshall, Pray-Harrold, and Mark Jefferson). For more information see the UWC web site: https://www.emich.edu/uwc/

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.

International Student Resource Center (200 Alexander Building) http://www.emich.edu/esl/isrc/ 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.

Tentative Topics to be Covered

I. Review

1. Introduction to Econometrics (Chapter 1)

2. Review Probability and Mathematical Statistics (Appendix B and C)

3. Review of Linear Regression Analysis (Chapter 2-4)

4. Heteroskedasticity (Chapter 8)

5. More on Specification and Data Issues (Chapter 9)

II. Advanced Topics

6. Pooling Cross Sections Across Time: Simple Panel Data Methods (Chapter 13)

7. Advanced Panel Data Methods (Chapter 14)

8. Instrumental Variables Estimation and Two Stage Least Squares (Chapter 15)

9. Simultaneous Equations Models (Chapter 16)

10. Limited Dependent Variable Models (Chapter 17)

III. Regression Analysis with Time Series Data

11. Basic Regression Analysis with Time Series Data (Chapter 10)

12. Further Issues in Using OLS with Time Series Data (Chapter 11)

13. Serial Correlation and Heteroskedasticity in Time Series Regression (Chapter 12)

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

Empirical Research Paper

The objectives of this empirical research paper are 1) to have each graduate student apply the econometric skills and knowledge from this course, together with your knowledge of economic theory, to a real world application of your choice; and 2) refine your professional writing skills. Start by finding empirical papers on your topic of interest that have been published in an economic journal. Finding published papers in economics is best achieved with a search engine such as Econlit or JStor from the Halle library site, or through Google Scholar. As you read through these papers try to come up with a testable hypothesis. Take note of where the data sources are for each paper so that you can track down the necessary data. I will also post a list of data sources on Canvas. 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), the data source(s), and an electronic copy of the data set. This is due on Canvas no later than **Wednesday, March 11 by 11:59 p.m.**

The final paper is due **Wednesday, April 8 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 title, 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, including whether data are time-series or cross-section and the sample covered by the data, units of measure for each variable, level versus change form, and key descriptive statistics (mean, median and standard deviation, 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. This section will also include an explanation and discussion of econometric results. In your discussion include: a discussion of the sign and significance levels for each explanatory variable; interpret each coefficient 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. Then discuss how you fixed each problem.

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?