

ECON 30335: Introduction to Linear Regression

Fall 2023

University of Notre Dame

Course Details

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Office: Jenkins Nanovic Hall 3009

Office Hours: Monday 10:00am-12:00pm

Class Meeting Times: Friday from 2:00pm-3:15pm

Class Location: Geddes Hall B034

Class Site: canvas.nd.edu

Course Overview

In economics, we use statistical methodology to assess and evaluate a theory's merits, as well as make predictions and forecasts. This class is a supplement to Statistics courses that do not cover linear regression which is a prerequisite for Econometrics. The course introduces linear regression models focusing on parameter estimation, hypothesis testing, the goodness of fit, and estimation issues that arise in using economic data. It will also prepare you for future work in economics, particularly Econometrics. You will also be introduced to the use of econometric software (Stata). We will discuss linear regression models, hypothesis testing, and multiple regression (Chapters 14-15). You will have opportunities to apply these concepts through additional readings that utilize the concepts and methods discussed in class. By the end of the semester, you should be able to read and understand basic economic research that uses the techniques we have developed in class. Further, you will be able to use Stata to implement the techniques we learn in the class.

Tentative Course Outline

Date	Topic	Readings
10/27	Introduction & Statistics Review	Ch. 7, 8.2, 9.1, 9.4, 9.6
11/3	Simple Linear Regression	Ch. 12
11/10	Linear Regression in STATA	
11/17	Multiple Regression	Ch. 15 (excluding 15.9)
12/1	Causal Inference, Regression in Practice	

Course Material

1. I highly recommend you obtain *Essentials of Statistics for Business and Economics* by Anderson, Sweeney, and Williams (ASW). Any edition will be fine, get the least expensive option that you can find.
2. Access to a computer with statistical software Stata.

Using Stata

Below are multiple ways to get access to it:

1. Purchase STATA: You can purchase a six-month license of STATA/BE for \$48. Note that the software will not run on a Chromebook.
2. Notre Dame Campus Computers: You can access STATA in-person on the Notre Dame library computers. Note with this option you need to be careful to save your work on Google Drive or by some other means so that you don't lose your work.
3. Notre Dame's Virtual Computer Lab: You can access a virtual Notre Dame computer with STATA on it from your own computer. The connection can be slow. Note with this option you need to be careful to save your work on Google Drive or by some other means so that you don't lose your work.

Exam and Grading

Final grades for the course will be based on the following:

Problem sets	60%
Final project	40%
Total	100%

Problem Sets

A total of 3 problem sets will be assigned throughout the course. The problem sets will be posted on Friday through Canvas. Submissions will be accepted through Canvas and will be **due Fridays at 1:59 pm** (right before class). **Submissions will be accepted only as PDF.** You are encouraged to work in groups on the problem sets, but please turn in your own solutions. Keep in mind that the problem sets are designed to help you grasp and apply the concepts discussed in class and consequently the project, so the more you put into them, the more you get out of them (beware the risk of free riding!). Each problem set, therefore, accounts for 20% of your overall course grade. Late problem sets will not be accepted. Failure to turn something in on time will result in a 0%. I will provide solutions to all the problem sets after they have been submitted.

Problem sets will contain a mixture of objective true/false and/or multiple choice questions, along with several questions requiring you to use math, tables, graphs, and or words in your answer. Some problem sets will include STATA problems for which you will require access to the software.

Item	Date
Problem set 1 due	November 3
Problem set 2 due	November 10
Problem set 3 due	November 17

Final Project

This project will be the culmination of the course's work. Other than familiarizing you with coming up with interesting research topics, it will incorporate all that you will learn in class this semester: identify variables and data, formulate a linear regression model, use least square estimation, and conduct hypothesis testing. In addition, it will involve using your Stata skills. For this project, you will be asked to come up with a linear regression model

that takes the concepts we will be learning in class into the “real” world. You are required to formulate a regression model, find data to estimate the model using least squares (coefficients, standard errors, and confidence intervals) and conduct a hypothesis test of significance and submit a report of your data analysis result for this course. Linear regression is all about being able to apply the techniques that you learn in the classroom in real world to better understand data for different purposes. The following table shows the schedule and deadlines for your final project:

Item	Date
1. Question and data set	November 10
2. First draft due	November 17
3. You will receive feedback on your first draft	November 24
4. Final report due	December 8

1. **Question & potential data source:** Your first task is to identify an interesting question for your research. By Friday, November 10 you need to submit a one paragraph document to Canvas outlining a topic that you are interested in and data sources from which you can get data related to your topic. If you are struggling with a research idea or data, you need to come and see me and we will figure out what is best for you. You may collect your data via an observational study or survey.
2. **First Draft:** The first draft is due on Friday, November 17 via Canvas. To receive full credit, you must submit a document that clearly outlines your research topic, data set, data sources and does some initial analysis of the data. The quality and amount of initial analysis you do is up to you and won't alter your grade, but you do need to have some initial analysis. The first draft is meant to a place for you to explore your data and get as much feedback as you would like. The more detailed and complete your analysis is, the better feedback I will be able to provide you, which will make your final draft much better and easier to complete. It should be anywhere from 1-3 pages. Approximately within a week after you submit your first draft, you will receive feedback from me.
3. **Final report:** Final draft is due Friday, December 8 via Canvas. The final report should be between 3-5 pages long including all tables, graphs, and figures. In your final draft you should include a complete statement of your problem, data description, and source, methodology, findings, and interpretation (including estimated coefficients,

standard errors, and confidence intervals), results from hypothesis testing for significance, and suggest additional variables that can be used to answer your question in a multivariate regression framework. All Stata files should be submitted via Canvas.

Your projects will be graded based on:

1. Consistency: Did you answer your question of interest?
2. Clarity: Is it easy for your reader to understand what you did and the arguments you made?
3. Relevancy: Did you use statistical techniques wisely to address your question?
4. Interest: Did you motivate your question?

Class Attendance and Participation

Class participation is vital to success in this course. It will be nearly impossible to do well in this course without regular attendance. Unless you have a legitimate excuse (family or health related emergency, NCAA athletics competition away, or job interview), please make every effort to attend class and not leave early. When you must miss a class, it is your responsibility to get the assignments from me or a classmate. I will be more than happy to help you with course material outside of class as long as you attend class and put forth the proper effort.

Expectations

Grading

The grade distribution for the course is as follows: (s denotes your total score)

A	$s \geq 92$	C+	$72 \leq s < 76$
A-	$88 \leq s < 92$	C	$68 \leq s < 72$
B+	$84 \leq s < 88$	C-	$64 \leq s < 68$
B	$80 \leq s < 84$	D	$50 \leq s < 64$
B-	$76 \leq s < 80$	F	$s < 50$

I will be using the gradebook on the course website through Canvas. This will allow you to keep close track of your performance in the course.

Academic honesty

You are expected not to engage in academic dishonesty. One of the goals of this course is to prepare you to do well in advanced economics courses, and build the basic foundations of regression analysis for research projects and future careers, so it is essential that you develop a solid understanding of the material. To that end, while collaboration on problem sets is encouraged in this course, copying is not. Students are expected to understand and abide by the University's honor code.