Applied Regression Analysis for Public Policy

DOPP 5360 – Fall 2023

Instructor: Ljubica Nedelkoska, PhD, Visiting Professor
Department of Public Policy, Central European University
U.S. credits: 2**, ECTS**: 4
Time:
Tuesday & Thursday, Sep 19 – Oct 24, 8:50-10:30
Final exam on Friday, Oct 27, 13:30-15:30
Location A-018 Computer Lab
Contact: NedelkoskaL@ceu.edu
Office hours: By appointment (office B417)
CEU Learning site

Course description

This class provides an intuitive and practical introduction to applied econometrics – the practice of analyzing quantitative data with statistical methods. The primary objective is to equip students with the quantitative techniques that are essential to evidence-based policy-making and necessary for post-graduate academic research in the quantitative social sciences (economics, peace science, political science, sociology, etc).

The course covers the fundamentals of regression analysis. The course begins with a brief review of the necessary ingredients from probability and statistics. Coverage of the linear regression model and regression diagnostics constitutes the core of the course. Once a firm understanding of basic models is attained, we move on to some more advanced regression techniques, including, but not limited to, non-linear regression, models with limited dependent variables, panel data analysis, and the evaluation of causal relationships.

From day one, students will learn the basic functionality of the statistical software package Stata, starting with the generation of descriptive statistics and graphics. Students who prefer to work with R are encouraged to attend the course, and conduct the exercises using R.

Primary learning objectives

1. Understand the fundamentals of regression analysis.
2. Acquire basic proficiency in the statistical software Stata, programming, creating graphs, and interpretation of statistical outcomes. Practice skills in R.
3. Learn about some advanced techniques in regression analysis.
4. Discuss econometric output within the context of analytical policy making/evaluation.
5. Assess the validity of an econometric study/report.
6. Gain experience conducting independent quantitative research.

Prerequisites

None. Knowledge of differential calculus and experience with programming languages give students a head start.

Requirements and evaluation

Homework 1	10%
Homework 2	10%
Homework 3	10%
Homework 4	10%
Class participation	10%
Mid-term exam	20%
Final Exam	30%

Workload

The workload for the course is spread across three elements. First, all students are expected to attend the lectures regularly, show up on time and stay until the end of the class. The 10 points for class participation are based on activity during lectures and are not given for attendance only. Second, students are expected to study the materials covered in class continuously, and the homework and mid-term exam are designed to help students achieve this. Third, students are expected to spend a substantial amount of time studying for the final exam. Overall, students should count on spending about 120 hours on this course:
Class attendance/participation: 21 hours
Class preparation (readings, homework): 50 hours
Exams: 50 hours

Grading scale

	CEU Grading System					
Grade	Name	Austrian equivalent	Hungarian equivalent	Points (0-4 scale)	Points (0-100 scale)*	Credit
A	Outstanding	Excellent (1)	Jeles (5)	4	100-96	yes
A-	Excellent	Excellent (1)	Jeles (5)	3.67	95-88	yes
B+	Good	Good (2)	Jó (4)	3.33	87-80	yes
B	Fair	Satisfactory (3)	Közepes (3)	3	79-71	yes
B-	Satisfactory	Sufficient (4)	Elégséges (2)	2.67	70-63	yes
C+	Minimum Pass	Sufficient (4)	Elégséges (2)	2.33	62-58	yes
F	Fail	Insufficient (5)	Elégtelen (1)	0	57-0	no

*Erasmus Mundus joint programs that, as of academic year 2020/21, have an existing consortium agreement regulating grade conversion among the participating universities are not required to adopt the CEU scale for calculating inter-university equivalencies in the period covered by their existing framework agreement. However, the transition to the CEU conversion should be made at the earliest opportunity and no later than the next amendment of the consortium agreement.

Course outline

1. Introduction

Sep 19 (Tuesday): Review of probability.

- Stock & Watson (S & W) chapters 1 and 2.
- Organizing and cleaning your data.

Sep 21 (Thursday): Review of statistics.

- S & W chapter 3.
- Probability and statistics using Stata/R. Visualizing bivariate relationships.

2. Linear regression model

Sep 26 (Tuesday): Linear regression with one regressor – estimation and hypothesis testing

- Homework 1 (Review of probability and statistics) due.
- S & W chapters 4 and 5.
- Practicing regression. Understanding linear regression output.

Sep 28 (Thursday): Multiple linear regression – estimation and hypothesis testing

- S & W chapters 6 and 7.
- Practicing regression in Stata/R.

3. Further topics in regression analysis

Oct 3 (Tuesday): Non-linear regression – quadratic regression, logarithmic regression, interaction terms

- Homework 2 (Fundamentals of linear regression) due.
- S & W chapter 8.
- Exercises: polynomial fitting, logarithmic transformation, interaction terms.

Oct 5 (Thursday): Mid-term exam

- In-class exam.

Oct 10 (Tuesday): Assessing studies based on multiple regression

- S & W chapter 9.
- Practicing model specification, regression diagnostics, and producing publishable regression tables.

Oct 12 (Thursday): Assessing studies based on multiple regression

- KIPP Lynn Case Study.

Oct 17 (Tuesday): Instrumental variable regression

- Homework 3 (Assessing studies based on multiple regression) due.
- S & W chapters 12.
- Stata/R exercises: Two Stage Least Squares.

Oct 19 (Thursday): Regression analysis with panel data

- S & W chapter 10.
- Panel data using Stata.

Oct 24 (Tuesday): Regression with limited dependent variables

- Homework 4 (Instrumental variable regression, panel data) due.
- S & W chapter 11.
- Logit and probit models in Stata/R.

Oct 27 (Friday 13:30 – 15:30): Final exam

- In-class exam.

Primary textbook

Introduction to Econometrics – Global Edition, James Stock and Mark Watson, (on reserve at CEU library, electronic and hardcopy, various editions).

Online resources

Seeing theory: A visual introduction to probability and statistics

CEU Learning site for the course

Web site companion to the textbook

Getting Started with Stata for Windows

Getting Started with Stata for Mac

Publication-quality graphics in Stata

Additional sources

An Adventure in Statistics: The Reality Enigma, Andy Field, 2016

Introductory econometrics: A modern approach. Wooldridge, Jeffrey M., 2015.

A Gentle Introduction to Stata, Alan Acock, 2012.

An Introduction to Stata Programming, Christopher Baum, 2009.

An Introduction to Modern Econometrics Using Stata, Christopher Baum,2006.

A Guide to Econometrics, 6E, Peter Kennedy, 2008.

Essentials of Statistics for the Behavioral Sciences, Frederick Gravetter and Larry Wallnau, 2008.

Jonathan Schwabish, An economist's guide to visualizing data," *Journal of Economic Perspectives*, 28(1): 209 – 34 (2014).

Mostly Harmless Econometrics, Joshua Angrist and Jörn-Steffen Pischke, 2008.
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