

ECONOMETRICS I
(Thursday 10.00-12.50)

Syllabus

Instructor: Prof. Dr. Hüseyin Taştan

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Classnotes: <https://github.com/htastan/Econometrics-I>

Office: Davutpaşa Campus, IIBF/G2-205

Office Hours: Thursdays, 14.00-16.00

Course assistant: tba



SCOPE and PURPOSE

The purpose of this course is to teach fundamental methods of analysis in econometrics at an undergraduate level. Econometrics basically deals with developing statistical methods for estimating and testing economic relationships and theories. This is reflected in the following definition of econometrics: “*Econometrics may be defined as the social science in which the tools of economic theory, mathematics, and statistical inference are applied to the analysis of economic phenomena*” (A. Goldberger). Econometrics focuses on the analysis of nonexperimental economic data. Although some social experiments can be devised it is usually impossible to conduct economic experiments. Unlike statistical methods employed in natural sciences, econometrics develops special methods to handle nonexperimental economic data.

Econometrics software: We will use R in class and in lab sessions. R is an open-source software for statistical computing and graphics which is widely used by statisticians, researchers, data scientists and econometricians as well as industry professionals. The latest version of R can be downloaded from:

<https://www.r-project.org/>

And R-studio may be used as an integrated development environment for R:

<https://www.rstudio.com/products/RStudio/>

DataCamp for the classroom: DataCamp provides free access to its data science learning platform through this program, <https://www.datacamp.com/universities>. Limited number of seats are available for interested students. I will send an invite link to your university emails. You need to enroll to DataCamp using your institutional emails with domain std.yildiz.edu.tr

PREREQUISITES

- Statistics I-II; also basic knowledge of algebra and calculus at the college level (Maths I-II) but passing is not required.

TEXTBOOK

Main Text: J.M. Wooldridge (W), *Introductory Econometrics: A Modern Approach*, 6th ed., 2016, Cengage Learning.

R applications based on the Wooldridge’s text:

- F. Heiss (H), *Using R for Introductory Econometrics*, 2016, CreateSpace.
Online version and other materials available at: <http://www.urfie.net/>

ADDITIONAL MATERIALS

- Class notes (see the link above)
- J. H. Stock and M.W. Watson (SW), *Introduction to Econometrics*, 3rd ed., 2015, Pearson.

EVALUATION

Midterms: 60% (Midterm I around 8th week, Midterm II around 12th week, 30% each)

Final: 40% (following the last day of classes)

CLASS SCHEDULE (W: Wooldridge, H: Heiss, SW: Stock and Watson)

Week	Topics	Preparation
Week 1 (Oct. 3)	Introduction to Econometrics: Definition, scope and purpose of econometrics, Types of economic data, Causality and the notion of ceteris paribus, Review of concepts in statistics and mathematics. Lab: Complete Datacamp course: https://app.datacamp.com/learn/courses/free-introduction-to-r	W: ch. 1 SW: ch. 1-2-3 H: ch. 1
Week 2 (Oct. 10)	Simple (Bivariate) Regression Model I: Estimation problem, Ordinary Least Squares (OLS) Estimation, Algebra of OLS Lab: Handling data in R, bivariate regression analysis using R	W: ch. 2 SW: ch. 4 H: ch. 2
Week 3 (Oct. 17)	Simple (Bivariate) Regression Model II: Incorporating nonlinearities, Finite Sample Properties of OLS estimators: Unbiasedness, Efficiency, variance of OLS estimators, t-test, confidence interval Lab: bivariate regression analysis using R	W: ch. 2 SW: ch. 4-5 H: ch.2
Week 4 (Oct. 24)	Multiple Linear Regression Model I: Estimation, Assumptions of the classical model, Gauss-Markov Theorem Lab: multiple regression analysis using R	W: ch. 3 SW: ch. 6 H: ch. 3
Week 5 (Oct. 31)	Multiple Linear Regression Model II: Statistical Inference, Hypothesis Tests, t-test Lab: conducting tests in multiple regression analysis using R	W: ch. 4 SW: ch.7 H: ch. 4
Week 6 (Nov. 7)	Multiple Linear Regression Model III: testing multiple linear restrictions, F-test, Lagrange Multiplier (LM) test Lab: hypothesis tests in regression analysis using R	W: ch. 4 H: ch. 4
Week 7 (Nov. 14)	Asymptotic properties of OLS estimators, Consistency and asymptotic normality Lab: R applications and solutions to selected problems	W: ch. 5 H: ch. 5
Week 8 (Nov. 21)	Midterm I (exact date and time to be announced later)	
Week 9 (Nov. 28)	Functional form in the multiple regression model, quadratic terms in the regression, interaction terms, goodness-of-fit measures, prediction Lab: R applications and exercises	W: ch. 6 H: ch. 6
Week 10 (Dec. 5)	Incorporating qualitative information in the model: Dummy (binary) variables in regression models Lab: R applications and exercises	W: ch. 7 H: ch. 7
Week 11 (Dec. 12)	Binary dependent variables: linear probability model (LPM), Logit model Lab: R applications and solutions to selected problems	W: ch. 7 H: ch. 7
Week 12 (Dec. 19)	Midterm II (exact date and time to be announced later)	
Week 13 (Dec. 26)	Heteroskedasticity (Lab: R applications on heteroskedasticity)	W: ch. 8 H: ch. 8
Week 14 (Jan. 2)	Misspecification and data problems	W: ch. 9 H: ch. 9
Week 15 (Jan. 9)	Misspecification and data problems (cont'd) Lab: R applications and solutions to selected problems	W: ch. 9 H: ch. 8
	Final exams	