

Ljubljana Doctoral Summer School

8 – 12 July 2024

15:00 – 19:00 (CET, Ljubljana)

APPLIED DISCRETE CHOICE AND PANEL DATA ANALYSIS WITH STATA AND R (ECTS: 4)

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Aims of the course

In order to understand the complicated economic, financial and business environment, it is vital to be able to quantify and analyse economic, financial and business data competently. Discrete choice and panel data analysis are among the most comprehensive approaches to achieve this goal. The purpose of this course is to review the linear regression model and then introduce, based on this, specialized topics of discrete choice and panel data analysis. The former include binomial, multinomial and ordered models, whereas the latter focus on static and dynamic approaches. The course is very much practically oriented; the methodological concepts are applied to actual data through various examples and case studies in economics, finance and business.

Objectives and competences of the course are the following: (1) to improve and expand the knowledge of quantitative skills with discrete choice and panel data methods; (2) to develop the capability to choose appropriate techniques for discrete choice and panel data analysis of various relationships in economics, finance and business; and (3) to develop the capability to correctly interpret the analytical results obtained or found in economics, finance and business. After completing this course, the student should be able to set up independently the research problem and perform applied discrete choice and panel data regression analysis.

Syllabus

1 MULTIPLE REGRESSION MODEL

- 1.1 Data generating process and the model
- 1.2 Least squares estimator
- 1.3 Properties of the least squares estimator
- 1.4 Fit of the regression
- 1.5 Hypothesis testing

2 DISCRETE CHOICE ANALYSIS

- 2.1 Latent variable approach
- 2.2 Maximum likelihood estimation
- 2.3 Binomial discrete choice models



- 2.3.1 Linear probability model
- 2.3.2 Probit model
- 2.3.3 Logit model
- 2.3.4 Model comparison and interpretation
- 2.4 Multinomial discrete choice models
 - 2.4.1 Multinomial models for individual-specific data
 - 2.4.2 Multinomial models for alternative-specific data
 - 2.4.3 Multinomial models for mixed data
 - 2.4.4 Ordered discrete choice models
 - 2.4.5 Model comparison and interpretation

3 PANEL DATA ANALYSIS

- 3.1 Static panel data analysis
 - 3.1.1 Fixed effects estimator and its alternatives
 - 3.1.2 Random effects estimator
 - 3.1.3 Choice of static panel data estimator
 - 3.1.4 Model diagnostics for static panel data models
- 3.2. Dynamic panel data analysis
 - 3.2.1 Anderson–Hsiao estimator
 - 3.2.2 Arellano–Bond or difference GMM estimator
 - 3.2.3 System GMM estimator
 - 3.2.4 Choice of dynamic panel data estimator
 - 3.2.5 Model diagnostics for dynamic panel data models

Tentative schedule:

SESSION 1:

Classical linear regression model and its extensions, least squares estimator and its properties, fit of the regression, hypothesis testing, additional practical demonstrations in Stata and R.

SESSION 2:

Latent variable approach, maximum likelihood estimation, linear probability model, probit model, logit model, model comparison and interpretation, additional practical demonstrations in Stata and R.

SESSION 3:

Multinomial models for individual-specific and alternative-specific data, multinomial models for mixed data, ordered discrete choice models, additional practical demonstrations in Stata and R.

SESSION 4:

Fixed effects estimator and its alternatives, random effects estimator, choice of static panel data estimator, model diagnostics, additional practical demonstrations in Stata and R.

SESSION 5:

Anderson–Hsiao estimator, Arellano–Bond estimator, system GMM estimator, choice of dynamic panel data estimator, model diagnostics, additional practical demonstrations in Stata and R.

Course delivery

The course consists of lectures with integrated computer exercises. Lectures use interactive teaching methods with MS PowerPoint presentations, PDF lecture notes and numerous demonstrations in Stata and R statistical software for data science (everything is done equivalently in both software). Methodological approaches taught at any given lecture are further demonstrated with actual data from economics, finance and business.

Course materials / List of readings

1. Cameron, A. C. and P. K. Trivedi: *Microeconometrics Using Stata*. College Station, TX: Stata Press, 2009.
2. Gujarati, D. N. and D. C. Porter: *Basic Econometrics: Fifth Edition*. Boston: McGraw-Hill/Irwin, 2009.
3. Hill, R. C., W. E. Griffiths and G. C. Lim: *Principles of Econometrics: Fifth Edition*. Hoboken, NJ: John Wiley & Sons, 2018.
4. Long, J. S. and J. Freese: *Regression Models for Categorical Dependent Variables Using Stata: Third Edition*. College Station, TX: Stata Press, 2014.

Lecture notes will be provided for course participants at the start of the course. No reading or extra preparation is required prior to the course.

Prerequisites

Lecture notes will be provided for course participants at the start of the course. No reading or extra preparation is required prior to the course.

Course credit

Participants needing course credit for their studies will get a take-home final exam, comprised of two tasks. The tasks will be distributed after the course as agreed with the participants during the course.

Course leader

Miroslav Verbic is Professor of Econometrics and Professor of Finance at the University of Ljubljana, and Senior Research Fellow at the Institute for Economic Research in Ljubljana. He earned his MSc in Econometrics in 2006 at the University of Amsterdam, and his PhD in Economics in 2007 at the University of Ljubljana. He teaches econometrics at the graduate and undergraduate level at the University of Ljubljana, and abroad as a visiting professor. Since 2015, he has been an expert evaluator for Horizon 2020 of the European Commission's Research Executive Agency. His research interests include econometric modelling, general equilibrium modelling, asset pricing modelling, social security analysis, energy economics, welfare economics, and environmental economics. He is the author of five scientific monographs and more than sixty refereed scientific articles, published in prestigious international scientific journals. He is promoting his research activity in professional associations, such as Econometric Society, International Association for Research in Income and Wealth, and Royal Economic Society. He is engaged in several projects commissioned by the Slovenian government and the European Commission as either head or member of the research team.

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