Introduction to the course

658EC Intermediate Econometrics (Giovanni Millo and Vincenzo Gioia, DEAMS - University of Trieste, 2025)

Beyond simple OLS

Why this course when we have the linear model and the OLS estimator?

OLS is not a universal solution (even if we maintain linearity):

- Non-spherical disturbances
  - Heteroskedasticity
  - Correlation (in time or space)
- Endogeneity
  - Feedback
  - Measurement errors
  - Omitted variables
- Special responses
  - Binary outcomes
  - Truncation/Censoring
  - Count data

make estimation and/or inference invalid.

Structure of the course

The course 658EC-1 is organized into two sections:

Giovanni Millo, 15h: Generalizing OLS and inference for continuous y

- Robust estimation of $V(\hat{\beta})$
- Generalized Least Squares
- Instrumental Variables

Vincenzo Gioia, 30h: Maximum Likelihood methods for special responses

- Binary responses
- Discrete choices
- Truncation/Censoring
- Count data

(It is complemented by 658EC-2 – Panel Data)

Prerequisites

Statistical inference

- Estimation of unknown parameters
- Hypothesis testing
- The concept of *data generating process* (DGP)
- The idea of a *model*

Estimators:

- least squares ([O]LS)
- maximum likelihood (ML)

Statistical hypothesis testing (Neyman-Pearson)

Prerequisites

The linear regression model

- Concept/Motivation
- Estimation
- Inference

(will be reviewed)

Matrix algebra for least squares problems

- Matrix representation of regression
- Matrix operations and conformability
- Linear dependence
- Matrix inversion

(will be reviewed)

Textbook

The reference textbook is:

- Yves Croissant (2025), *Microeconometrics with R*, Routledge.

which has a free online version, with executable examples:

`https://ycroissant.github.io/micsr_book/`

You are not supposed to study (only) on slides! These are a support for the speaker teaching the program, not "the program" itself.

Timetable

Intermediate Econometrics:

- Wed 12 - 15, Room 3_C
- Fri 9 - 11, Room 4_D

(Panel Data Models:

- Mon 15 - 17, Room 4_D

starting from October 5th)

Learning assessment

Exam at the end of the course

- Oral exam

Labs/assignments during the course

Contacts

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Vincenzo Gioia: `vincenzo.gioia@units.it`
Office hours: Friday, 11:00 - 12:30 (Building D, room 2.13)