UNIVERSITÀ DEGLI STUDI DI MILANO

UNIVERSITÀ DI PAVIA

Ph.D. in ECONOMICS – Universities of Milan and Pavia

Microeconometrics

Academic year 2025-26 – Third Term

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Office hours: after the lectures, or by appointment on Tuesday (17:00-19:00)

Course description:
This course covers two major topics in microeconometrics: panel data and limited dependent variables. The panel data section explores various models, including basic linear models, fixed vs. random effects, dynamic models, and GMM methods, along with techniques for estimating causal effects like TWFE, DID, and synthetic controls. The limited dependent variables section introduces maximum likelihood estimation and covers binary models (Probit, Logit), discrete choice models, and censored/truncated models such as Tobit and sample selection models like the Heckman selection model. Finally, it discusses duration models, focusing on hazard functions and likelihood estimation for censored data.

Learning objectives and outcomes:
This course is intended to provide students with the most widely used and up-to-date econometric tools of analysis of microdata (individual, household or firm data). The course combines both theoretical and empirical aspects of some of the most important microeconometric methods. We will discuss how to choose and to implement the most suitable tools in contexts typically encountered by empirical researchers. We aim at enabling students both to conduct their own empirical research projects, and assess empirical research papers. We will implement each of the techniques using standard statistical software (Stata) and real-world data.

Course prerequisites: Solid background in Probability, Statistics and Introductory Econometrics

Course organization: 20 hours of lectures

Course Assessment: Written Exam

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Syllabus:

1. Methods of Moments and GMM

2. Panel Data
    a. Panel Data Models
        i. Basic linear models
        ii. Fixed effects vs random effects
        iii. Dynamic models
        iv. GMM methods in panel data
        v. Extensions to nonlinear models
    b. Learning from Fixed Effects
    c. Estimating Causal Effects with Panel Data
        i. TWFE and DID
        ii. Synthetic Controls
    d. Clustering

3. Limited Dependent Variables
    a. Intro on Maximum Likelihood
        i. Binary models: Probit, Logit and Linear Probability Model
    b. Discrete choice models:
        i. Ordered and Unordered Choices;
        ii. Multinomial / Conditional / Mixed Logit Models;
        iii. Ordered Probit
    c. Censored and Truncated Models
        i. Censoring and Truncation
        ii. Tobit model
    d. Sample Selection Models
        i. Sample selection
        ii. Generalized Tobit
        iii. Heckman Selection Model
    e. Duration models
        i. Duration data
        ii. Hazard function and conditional hazard function
        iii. Likelihood functions of censored and complete durations

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Course Materials and References

1) Lectures slides
2) Selected Chapters from Suggested Textbooks:
    a. Cameron, A. Colin and Pravin K. Trivedi (2005), Microeconometrics: Methods and Applications, Cambridge University Press
    b. Angrist, Joshua D. and Jörn-Steffen Pischke (2009), Mostly Harmless Econometrics: An Empiricist's Companion, Princeton University Press.
    c. Wooldridge, Jeffrey M. (2002), Econometric Analysis of Cross Section and Panel Data, MIT Press.
3) Suggested Academic Articles (full list will be provided during the course)