

ECONOMETRICS
Manuel Arellano
CEMFI, 2016-2017

Lectures: Mon 9:30-11:00, Wed 9:30-11:00.

Exercises: Wed 11:30-13:00 conducted by **Tincho Almuzara** almuzara@cemfi.edu.es

Grades will be based on class exercises (20%) and final exam (80%).

Course outline

Part I: Regression

1. Least squares

- 1.1 The linear model
- 1.2 Asymptotic properties of OLS
- 1.3 Flexible nonlinear regression
- 1.4 Beyond means: quantile regression

2. Heteroskedasticity and clustering

- 2.1 Robust variance estimation
- 2.2 Cluster standard errors
- 2.3 Generalized least squares estimation
- 2.4 Grouped data

Part II: Likelihood methods

3. Maximum likelihood and large sample testing

- 3.1 Consistency and asymptotic normality
- 3.2 Asymptotic testing
- 3.3 M-estimators
- 3.4 Bootstrap methods

4. Bayesian inference

- 4.1 Bayesian analysis
- 4.2 Specifying prior distributions
- 4.3 Large-sample Bayesian inference
- 4.4 Markov chain Monte Carlo methods

Part III: Time series

5. Stochastic processes

- 5.1 Stationarity and ergodicity
- 5.2 Autoregressive and moving average models
- 5.3 Asymptotics with dependent observations
- 5.4 Nonstationary processes

6. Time series regression

- 6.1 Regression models for time series
- 6.2 Robust inference
- 6.3 Granger causality
- 6.4 Cointegration

Part IV: Endogeneity

7. Instrumental variables

- 7.1 Measurement error
- 7.2 Simultaneity
- 7.3 Two-stage least squares
- 7.4 Generalized method of moments

8. Endogenous treatment effects

- 8.1 Potential outcomes
- 8.2 Matching methods
- 8.3 Self-selected treatment
- 8.4 Local average treatment effects

Textbooks

- F. Hayashi, *Econometrics*, Princeton University Press, 2000 (main text).
- J. Angrist and J.-S. Pischke, *Mostly Harmless Econometrics: An Empiricist's Companion*, Princeton University Press, 2009.
- C. Gourieroux and A. Monfort, *Statistics and Econometric Models*, vol. 1 and 2, Cambridge University Press, 1995.
- J. D. Hamilton, *Time Series Analysis*, Princeton University Press, 1994.
- J. Stock and M. Watson, *Introduction to Econometrics*, Pearson Education, 2nd edition, 2007.
- J. Wooldridge, *Econometric Analysis of Cross Section and Panel Data*, MIT Press, 2010.