

Econometrics

Ph.D. Program in Economics and Management (Economics)
Department of Economics and Management, University of Padova
Academic year 2016/17

Prof. Nunzio Cappuccio (nunzio.cappuccio@unipd.it)

Prof. Guglielmo Weber (guglielmo.weber@unipd.it)

Prerequisite

Students should know the key econometric methods to estimate linear models (OLS, GLS and IV methods) and testing hypotheses (acceptance and rejection, type I error, t tests, F tests, type II error and power, statistical significance, p-values, diagnostics (reset test, heteroskedasticity tests, autocorrelation tests), etc.). Useful references are Ref. 3 and Ref. 4.

Course description

The aim of the course is to provide a theoretical background that is useful for research in econometric methods and for applied research. Our focus will be the asymptotic properties of the most commonly used econometric estimators.

Syllabus

1. Regression, Linear Projection, Marginal effects, causal effects. (Ref. 1 Ch. 1 and 2; Ref. 5 Ch. 2).
 - 1.a) Conditional density, mean and variance.
 - 1.b) Independence concepts (stochastic, in mean and linear).
 - 1.c) The best linear predictor (linear projection) and its error.
 - 1.d) Marginal effects and causal effects.
2. Finite sample properties of the estimators with application to the OLS and GLS estimators (Ref. 1 Ch. 3 and 4, Ref. 2 Ch. 1).
 - 2.a) The OLS and GLS estimators.
 - 2.b) Finite sample properties of the OLS and GLS estimators: unbiasedness under strict exogeneity; variance under several hypotheses; efficiency; normal sampling distribution.
3. Asymptotic theory (Ref. 1 Ch. 5, Ref. 7, Ref. 8 Ch. 3, Ref. 9 Chs. 59-69, Ref. 2 Ch. 2)
 - 3.a) Modes of stochastic convergence: almost sure convergence, convergence in probability, mean-squares convergence, convergence in distribution, Relations between different concepts of stochastic convergence.
 - 3.b) Theorems on stochastic convergence: the laws of large numbers, central limit theorems, the Continuous Mapping and Slutski's theorems, the δ method.
4. Asymptotic properties of the OLS and GLS estimators (Ref. 1 Chs. 6, Ref. 6, Ref. 7, Ref. 2 Ch. 3).
 - 4.a) Asymptotic properties of estimators
 - 4.b) Consistency
 - 4.c) Asymptotic normality.
5. Topics on testing statistical hypothesis (Ref. 1 Ch. 8, Ref. 2 Ch. 3)
 - 5.a) Wald tests and criterion-based tests
 - 5.b) Asymptotic local power
6. Introduction to time series analysis: univariate and multivariate time series (Ref. 1 Ch. 16 and 17).
7. IV and GMM estimation of single equation linear model: definition, asymptotic properties, test statistics (Sargan/Hansen test, weak instruments test; Hausman test). (Ref. 1 Ch. 15, Ref. 2 Ch. 3).

8. GMM estimator and other extremum estimators (Ref. 1 Ch. 13, Ref. 2 Ch. 3 and Ch. 7).
9. Linear panel data models (Ref. 1 Ch. 19)

References

Main reference textbooks are Ref. 1 and Ref. 2.

- Ref. 1 Hansen, B. E.: Econometrics, <http://www.ssc.wisc.edu/~bhansen/econometrics/>, free download, several editions.
- Ref. 2 Fumio Hayashi (2000): Econometrics, Princeton University Press.
- Ref. 3 Stock, J. H. & M. W. Watson (2006): Introduction to Econometrics, 2nd edition, Addison-Wesley / Prentice Hall.
- Ref. 4 Wooldridge, J. (2009): Introductory Econometrics: A Modern Approach, 4th Edition, South Western
- Ref. 5 Wooldridge, J. (2001): Econometric Analysis of Cross Section and Panel Data, MIT Press
- Ref. 6 Colin Cameron: Brief Asymptotic Theory, downloadable from <http://cameron.econ.ucdavis.edu/e240a/asymptoticsw07.pdf>
- Ref. 7 James L. Powell: Elements of Asymptotic Theory, downloadable from <http://personal.lse.ac.uk/PIFFER/powell.pdf>
- Ref. 8 Takeshi Amemiya (1985): Advanced Econometrics, Basil Blackwell, 1985
- Ref. 9 Marco Taboga (2012): Lectures on probability theory and mathematical statistics, 2th edition, Amazon CreateSpace
- Ref. 10 Lecture slides (<https://elearning.unipd.it/economia/>)