Econometrics
Luigi Guiso

Course Description

The course is designed to provide an introduction of the basic procedures of econometrics, and to develop the tools to deal with applied economics problems. Emphasis is on application and use rather than method. The basic estimations procedures (least squares) are discussed with a particular interest in applications. The assumptions required by estimations procedures are discussed within three economics applications. A working knowledge of multivariate calculus and linear algebra is required.

Grading policy

Grades will be based on (the problem sets (20% with the lowest grade on the problem sets dropped)) and a final exam (80%). The problems sets have empirical and theoretical questions. There will be approximately four problem sets.

Readings and Reference Material

Any of the following books covers the concepts that will be developed in the course. References to more specific material will be given during lectures.

Greene, W. H. (2002), **Econometric Analysis**, Maxwell MacMillan International Editions. *Basic textbook*.

Johnston, J. and J. Dinardo (1997), **Econometric Methods**, McGraw-Hill.

Wooldridge, J. (2002), **Econometric Analysis of Cross Section and Panel Data**, MIT Press. It has a very interesting approach but it is too advance for many issues.

A recommended very helpful book for those interested in applied works is: Angus Deaton: *The Analysis of Household Surveys"* World Bank, 1997

Lecture notes and a few required articles will be made available.

Course outline (provisional)

1. *Introduction*
    a. Course requirements and overview
    b. Econometric software
    c. What econometrics is about
    d. Causality and forecasting
    e. Asymptotic

2. *Classical regression model*
    a. Multivariate regression and the least squares principle
    b. The Gauss-Markov theorem
    c. Hypothesis testing

3. *OLS failures: Heteroskedasticity, Autocorrelation, and Clustering*

    a. Autocorrelation and Heteroskedasticity: Definition, consequences and fixing
    b. Dealing with outliers
    c. Clustering
    d. Multicollinearity: consequences, detection, fixing

4. *OLS failures:* endogeneity
    a. Failure of the orthogonality conditions: consequences
    b. Causes of failure: measurement error, Different causes, same implication, almost same treatment (as we will see): why do new dare distinguishing
5. IV estimates
    a. Introduction to simultaneous equations
    b. Exact identification and rediced form estimation
    c. Two stage least squares
6. IV estimation: problems
    a. Invalid instruments
    b. Weak instruments
7. Topics
    a. Experimental data
    b. Quasi experiments
    c. Difference in difference
8. Introduction to panel data
    a. Random effects
    b. Fixed effects