# Introduction to Financial Econometrics

## Prof. Andrea Monticini

***COURSE AIMS AND INTENDED LEARNING OUTCOMES***

This course investigates the main econometric methods as a tool for the quantitative analysis of economic and financial phenomena. The application of econometric models allows measuring variables that are not directly observable, studying their relationships and behavior, testing and comparing alternative theories, as well as forecasting and simulating the effects of different policies.

This course heavily emphasizes the importance of applications. A discussion of the main theoretical issues and a systematic analysis of econometric tools are intended as prerequisites for the investigation of a series of problems that are of particular relevance for economic and financial applications. For this reason, the theoretical lectures will be complemented by a systematic series of financial and economic applications based on the use of both Gretl econometric software and Python programming language, through which the student will be in the position to autonomously develop econometric analysis, and perform empirical studies on financial and economic topics.

At the end of the course, students will:

* learn methods for estimating causal effects using observational data
* learn to evaluate the regression analysis of others – this means students will be able to read/understand empirical economics papers in other courses
* be able to prepare and independent empirical analysis using modern econometric techniques

### **Course Content**

Course outline and detailed learning goals:

1. *Regression Models:* brief review of regressions, along with a few reminders of things from statistics and probability theory.

 At the end of this section of the course the student will be able to:

– understand the nature and goals of econometric analysis, as well as the essential determinants of econometric models;

– recognize the different types of data (cross-sections, time series, pooled cross-sections, and panel) that are used in empirical analysis;

– specify a linear regression model;

– estimate a linear regression model by Method of Moments.

– estimate a linear regression model by Ordinary Least Squares.

2. *Hypothesis Testing in Linear Regression Models*

 At the end of this section of the course the student will be able to:

– test hypotheses about a single population parameter (the t test), testing hypotheses about a single linear combination of parameters, and deriving confidence intervals;

– test multiple linear restrictions;

– understand the difference between exact and asymptotic test.

3 *Confidence Intervals*

 At the end of this section of the course the student will be able to:

– construct exact and asymptotic confidence intervals.

4. *Time Series Analysis*

 At the end of this section of the course the student will be able to:

– estimate ARMA models;

– estimate Distributed Lag models;

– test for cointegration;

– estimate Error Correction Models.

5. *(G)ARCH Models*

 At the end of this section of the course the student will be able to:

– estimate (G)ARCH Models;

– test for endogeneous regressors.

### **READING LIST[[1]](#footnote-1)**

G. Koop, Analysis of Financial Data, Wiley

### **TEACHING METHOD**

The course is based on lectures.

### **ASSESSMENT METHOD AND CRITERIA**

There is an online Blackboard test for all the students. Students must show to know the theory of the regression models; what happens when some of the hypothesis behind the regression model do not apply; how to estimate a regression model using an econometric software; how to use an estimated model for forecasting financial variables and for policy analysis. The final exam is based on an online Blackboard test composed by three sections: A) six True/False questions; B) six Multiple choice question; C) six questions on an estimated econometric model, this section is focused on the empirical application of the econometric methods. Part A) counts 25%, part B) counts 25%, and part C) counts 50% respectively of the final grade.

***NOTES AND PREREQUISITES***

Before entering the course, the student should be familiar with:

– random variables and the features of their probability distributions (mean, median, variance and standard deviation), as well as the features of joint and conditional distributions (covariance and correlation, conditional expectation and variance and their properties);

*Office hour*

Information about office hour can be found on the webpage

1. I testi indicati nella bibliografia sono acquistabili presso le librerie di Ateneo; è possibile acquistarli anche presso altri rivenditori. [↑](#footnote-ref-1)