

INTRODUCTION to TIME SERIES ECONOMETRICS (MEI 2010)

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Description:

This course has two specific objectives: The first is to equip students with the necessary tools for the state-of-the-art empirical research with time series data in order to be able to study the economic reality. The second objective is to teach students how to analyze causal relationships between economic variables. To accomplish these two objectives, the course is divided in one theoretical part and one applied with extensive computer use. In the applied part the student must write an empirical project. This year the topic of this project is: Interest Rates and Economic Growth (see the corresponding file in the web page). At the end of the course the student should be able to analyze any bi-variate causal economic relationship (VAR models, cointegration, common factors, etc).

Grading:

The final grade consists of three components: Final Theoretical Exam (40 %); Final Practical Exam (20 %) and the Applied Project (40 %).

Software:

In this course we will be mainly using E -VIEWS (GRETU is free and very similar). From time to time we may use other time series software like: S-Plus o GAUSS.

COURSE OUTLINE

PART I: INTRODUCTION

1. INTRODUCTION I: EXPLORATORY ANALYSIS of ECONOMIC TIME SERIES
 - a) Graphical Analysis of Time Series
 - b) Different Measures and Components that Characterize the Time Series
 - c) Common Transformations of Time Series

2. INTROUCTION II: BASIC CONCEPTS
 - a) Stochastic Process: Time Series
 - b) Stationarity and Ergodicity
 - c) The Mean
 - d) Autocovariance and Autocorrelation functions

PART II: MODELS with UNIVARIATE INFORMATION

3. STATIONARY LINEAR MODELS

- a)* WOLD Representation
- b)* ARMA(p, q) Models: Identification, Estimation and Evaluation
- c)* Model Selection: Information Criteria (AIC y BIC)
- d)* Outliers
- e)* Examples
- f)* Apendix I: Conditional Expectation
- g)* Apendix II: Differential Equations

4. NONSTATIONARY LINEAR MODELS

- a)* Deterministic versus Stochastic Trends
- b)* Unit Root Processes: Testing and Estimation
- c)* Trend and Cycle Decompositions
- d)* Structural Changes
- e)* Examples

5. FORECASTING

- a)* Construction of Predictions with ARMA and ARIMA Models
- b)* Forecast Evaluation
- c)* Combination of Forecasts
- d)* Examples

6. NON-LINEAR MODELS

- a)* Stochastic Volatility
- b)* ARCH Models
- c)* Threshold Models
- d)* Examples

PART III: MODELS with MULTIVARIATE INFORMATION

7. REGRESSION ANALYSIS with TIME SERIES

- a)* Regression with Autocorrelated Errors.
- b)* Robust Standard Errors (HAC).
- c)* Dynamic Single Equation Models
- d)* Short and Long Run Multipliers. Mean and Median Lags.
- e)* Partial Adjustment Models.
- f)* Estimation and Inference with and without Autocorrelated Errors.

8. STATIONARY VECTOR MODELS

- a)* Introduction to VAR Models: Identification, Estimation and Inference
- b)* Impulse Response Function (IRF)
- c)* Granger Causality
- d)* Structural VAR Models
- e)* Blanchard and Quah Decomposition
- f)* Examples

9. NON-STATIONARY VECTOR MODELS: COINTEGRATION

- a)* Regression Analysis with I(1) Variables
- b)* Spurious Regression
- c)* Cointegration and Common Trends
- d)* Cointegration and Error Correction Models
- e)* Testing for Cointegration
- f)* Estimation of Cointegrated Systems
- g)* Permanent and Transitory Decomposition: Stock and Watson, and Gonzalo-Granger
- h)* Identification of Shocks
- i)* Examples

PART IV: ECONOMIC APPLICATIONS

10. PRESENT VALUE MODELS

- a)* Consumption and Income Relationship
- b)* Relationship between Interest Rates different Maturities
- c)* Price and Dividends Relationship

11. INTERNATIONAL ECONOMY

- a)* Analysis of Exchange Rates
- b)* Law of One Price (PPP)

12. ENVIRONMENTAL ECONOMICS: THE THEORY of GLOBAL WARMING

- a)* Is there a Trend in the Temperature?
- b)* Relationship between Temperature and CO₂ Emissions
- c)* Is Global Warming Caused by Human Activity?

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+ LECTURE NOTES