Al-Zahra
University

Advanced Econometrics (2) (M.A Program)
Course Syllabus
Department of Economics
Faculty of Social Sciences and Economics
Spring 2024
Class: Mon 11:00-12:30 and 13:00-14:30 at:Pouya Site
Course website: http://staff.alzahra.ac.ir/safarzadeh

Instructor: Esmaeel Safarzadeh   Office: Tydings 85692418
E-mail: e.safarzadeh@alzahra.ac.ir   Office Hour: 09:30-10:30 Mon, or by appointment

Course Description
Econometrics introduces you the regression methods for analyzing data in economics. This course emphasizes both the theoretical and the practical aspects of statistical analysis, focusing on techniques for estimating econometric models of various kinds and for conducting tests of hypotheses of interest to economists. The goal is to help you develop a solid theoretical and practical background in Advanced level econometrics, the ability to implement the techniques and to critique empirical studies in economics.

Prerequisite
This is the second Econometrics course for M.A student in Economics. The prerequisite courses include Statistical Methods in Economics or equivalent and Advanced econometrics (1). Students should be familiar with basic concepts in probability theory and statistical inference, elementary calculus especially difference equations and topics at Advanced level, such as Johnston and Dinardo's Econometric Methods.

Textbook
Required Textbooks:
- Watson, Patrick K. Teelucksingh, Sonja S. (2002). "**A Practical Introduction to Econometric Methods: Classical and Modern**", University of the West Indies Press.
- Tsay, Ruey S. (2010), "**Analysis of Financial Time Series**", Third Edition, John Wiley & Sons, Inc.
- Enders, Walter. (2014), "**Applied Econometric Time Series**" Forth Edition, John Wiley & Sons, Inc.
- Greene, William H. (2020). "**Econometric Analysis**", 8th Edition, Pearson Education Limited.

Evaluation
Grades for the course will be based on:
- Homework (4 problem sets): 20%.
- Appliedproject:30%.
- Final: 50%.
- Class participation/quizzes: 5% (bonus).

Software
This course will use EViews as our main statistical software. The latest version is EViews 13, but any version later than EViews 8 suffices for the purpose of this course.

Tentative Course Outline

Note the following course outline is tentative and therefore subject to change during the process.

1. **Specification (and Other) Tests of Model Authenticity** ([W.T] Ch. 11)
- Introduction
- Ramsey's RESET Test for Misspecification (Due to Unknown Omitted Variables)
- The Jarque–Bera Test for Normality
- The Ljung–Box and Box–Pierce Tests for White Noise
- The White Test for Heteroscedasticity
- The Breusch–Godfrey Test for Serial Correlation
- The Chow Test for Structural Breaks

2. **Introduction to Dynamic Models** ([W.T] Ch. 5)
- Dynamic Models
- Almon's Polynomial Distributed Lag (PDL) Scheme.
- The Koyck Transformation.
- The Partial Adjustment Model.
- The Adaptive Expectations Model.
- Error Correction Mechanism (ECM) Models.
- Autoregressive Distributed Lag (ADL) Models.
- The Durbin Test for Autocorrelation in the Presence of Lagged Endogenous Variables.

3. **Simulation of Econometric Models** ([W.T] Ch. 8)
- Introduction
- Dynamic and Static Simulation
- Some Useful Summary Statistics
  - ✓ Root Mean Square Error
  - ✓ Mean Absolute (or Mean Difference) Error
  - ✓ The Theil Inequality Coefficient
  - ✓ The Theil Decomposition
  - ✓ Regression and Correlation Measures
- Some Illustrations of the Use of Model Simulation
  - ✓ Evaluation of Goodness-of-Fit of Single Equation Systems
  - ✓ Forecasting with Single Equation Systems
  - ✓ Evaluation of Goodness-of-Fit of Multiple Equation Systems
- Dynamic Response (Multiplier Analysis) in Multiple Equation Systems
  - ✓ Illustration of Dynamic Response
  - ✓ Forecasting and Policy Simulations with Multiple Equation Systems

4. **Dummy dependent variable** ([G] Ch. 6))
- Problems whit using linear Classical Regression Models for binary dependent variable
- Linear probability models
  - ✓ Logit
  - ✓ Probit/normit
- Normalization rule in logit and probit models
- Marginal Effects
- Estimation of coefficients with MLE
- Goodness of fit Criteria

5. **Difference in Differences Regression** ([G] Ch. 6))
- Treatment Effects
- Examining the Effects of Discrete Policy Changes

6. **Willingness To Payment** ([G] Ch. 6))

7. **Economic Time Series and Their Characteristics** ([T] Ch. 1, [E] Ch. 1)
- Introduction
- Time-Series Models
- Difference Equations and Their Solutions
- Solution by Iteration
- The Cobweb Model
- Solving Homogeneous Difference Equations
- Particular Solutions for Deterministic Processes
- The Method of Undetermined Coefficients
- Lag Operators

8. **Linear Time Series Analysis and Its Applications** ([T] Ch. 2, [E] Ch. 2)
- Stationarity
- Correlation and Autocorrelation Function
- White Noise and Linear Time Series
- Simple AR Models
- Simple MA Models
- Simple ARMA Models, 64
- Unit-Root Nonstationarity
- Seasonal Models
- Regression Models with Time Series Errors
- Consistent Covariance Matrix Estimation
- Long-Memory Models

9. **Modelling Volatility** ([T] Ch. 3, [E] Ch. 3)
- Economic Time Series: The Stylized Facts
- ARCH and GARCH Processes
- The ARCH-M Model
- Additional Properties of GARCH Processes
- Maximum Likelihood Estimation of GARCH Models
- Other Models of Conditional
- Multivariate GARCH
- Volatility Impulse Responses

10. **Multivariate Time Series Analysis and Its Applications** ([T] Ch. 8, [E] Ch. 5)
- Introduction
- Vector Autoregression Models
- Evaluation of Vector Autoregression Models
    - ✓ The Impulse Response Function
    - ✓ Variance Decomposition
- Forecasting with Vector Autoregression Models
- Vector Autoregression Modelling and Causality Testing

11. **Cointegration** ([T] Ch. 8, [E] Ch. 6)
- Introduction
- The Vector Error Correction Model (VECM)
- The Engle–Granger (EG) Two-Step Procedure
- The Johansen Procedure
- Cointegration and Causality