

**UNIVERSITY OF DELHI  
DELHI SCHOOL OF ECONOMICS  
DEPARTMENT OF ECONOMICS**

**Minutes of Meeting**

**Subject** : B.A. (Hons) Economics– (CBCS) Fifth Semester (2017) DSEC  
**Course** : ii) Applied Econometrics  
**Date of Meeting** : 8<sup>th</sup> May, 2017  
**Venue** : Department of Economics, Delhi School of Economics,  
University of Delhi  
**Chair** : Prof. Pami Dua

**Attended by:**

Sr. No.	Name of the Teacher	College
1	Padma Suresh	Sri Venkateshwara College
2	Arun Kumar Kaushal	Shaheed Bhagat Singh
3	Vandana Tulsyan	Dyal Singh
4	Neelam singh	Lady Shri Ram College
5	Madhvi Moni	Hans Raj College
6	Deepika Goel	Aryabhatta College
7	Shilpa Chaudhary	Janki Deve Memorial College
8	Dushyant Chawla	Shyam Lal College (Evening)
9	Shweta Nanda	Atma Ram Sanathan Dharam
10	Indu Choudhary	Kalindi College
11	Poonam Kalra	St. Stephen's College

1. It was decided that for the academic session 2016-17, the main textbook would continue to be Basic Econometrics by Gujarati, Porter and Gunasekar(2012) supplemented by Wooldridge(2014) for selected topics. For applications using software, Econometrics by Example by Gujarati (2014) would be the recommended text.
2. It was also decided that in Section II.1 i.e. The Matrix Approach to Linear Regression Model, the entire Appendix C in Gujarati and Porter (2012), 5<sup>th</sup> edition (International) would be included in the reading list.

3. Teachers are advised to use the following textbook for reference in the Applied Econometrics course in the BA(Hons) Semester batch of 2016-17:

Asteriou, D and Hall, Stephen G, *Applied Econometrics*, 3<sup>rd</sup> Edition, 2015, Palgrave Macmillan.

4. The Applied Econometrics course must orient students to do a research project and get hands on experience with appropriate software (GRETLE/ EViews/ R/Stata/EXCEL). This would form part of the Internal Assessment.
5. It is to be noted that the topics on Dummy Variable and Specification error, which were deemphasized in the course on Introductory Econometrics in the fourth semester, would be covered in detail in this paper. However it was suggested that these topics may be shifted back to that course for the next round of fourth semester.

The details of the Syllabus, Topic-wise Reading list, recommended text books and Student Assessment summary are attached.

## **SYLLABUS**

- I. Stages in Empirical Econometric Research
- II. The Linear Regression Model: Estimation, Specification and Diagnostic Testing
  - i. The Matrix Approach to Linear Regression Model: The k- variable regression model, Assumptions of the Classical Linear Regression Model, OLS estimation, Variance-Covariance Matrix, Coefficient of Determination  $R^2$ .
  - ii. Review of Functional forms and Qualitative explanatory variable regression models
  - iii. Regression Diagnostics
    - a. Detection of and remedial measures for Multicollinearity, Autocorrelation and Heteroscedasticity.
    - b. Model Selection and Diagnostic Testing
      1. Tests of Specification errors: Detecting the presence of unnecessary variables, omitted variables and incorrect functional form ( Ramsey RESET and Lagrange Multiplier Test for Adding Variables)
      2. Errors of measurement: Consequences and remedial measures
      3. Model Selection Criteria:  $R^2$  and Adjusted  $R^2$  criteria, Akaike's Information Criterion and Schwarz's Information Criterion.
      4. Additional topics in modelling (Outliers, Leverage, Influence; Recursive least Squares; Chow's Prediction Failure Test; Missing Data)
      5. Non-normal errors and stochastic regressors
- III. Advanced Topics in Regression Analysis
  - i. Dynamic Econometric Models
    - a. Distributed Lag Models: Nature of lagged phenomena, Estimation using Koyck transformation (The Adaptive Expectations and Partial Adjustment Models)
    - b. Estimation of Autoregressive Models
  - ii. Instrumental Variable Estimation
    - a. Omitted variables in a simple regression model
    - b. Measurement errors
- IV. Panel Data Models and Estimation techniques

The Pooled OLS Regression Model, the Fixed Effect Least Squares Dummy Variable Model, the Fixed Effect within Group Estimator, the Random Effects Model.

- V. Introduction to Econometric Software (GRET/ EVIEWS/ R /Stata/ EXCEL: ANY ONE)
- i. Generation of data sets and data transformation; data analysis (Graphs and Plots, Summary Statistics, Correlation Matrix etc.)
  - ii. Running an OLS regression; Testing for Linear Restrictions and Parameter Stability.
  - iii. Regression Diagnostics: Collinearity, Autocorrelation, Heteroscedasticity, Normality of residuals
  - iv. Estimation of Other Linear Models: Weighted Least squares, Cochran-Orcutt/ Hildreth-Lu/ Prais-Winsten etc.
  - v. Model Selection Criteria (AIC, SIC) and Tests (Adding and Omitting Variables, Non Linearities: Squares, Cubes and Logs, Ramsey's RESET test)

### Topic-wise reading list

S.No.	TOPIC	REFERENCES FROM RECOMMENDED TEXT BOOKS
I.	Stages in Empirical Econometric Research	<ul style="list-style-type: none"> <li>• Chapter 1, Introduction, Section 1.3: 'Methodology of Econometrics' in Gujarati, Porter and Gunasekar, Basic Econometrics, 5th ed.</li> </ul>
II.i.	The Matrix Approach to Linear Regression Model	<ul style="list-style-type: none"> <li>• Appendix-C: 'The Matrix Approach to Linear Regression Model' in Gujarati and Porter, Basic Econometrics, International 5<sup>th</sup> ed.</li> </ul>
II.ii.	Review of Functional forms and Qualitative explanatory variable regression models	<ul style="list-style-type: none"> <li>• Chapter 2 'Functional Forms of Regression Models'</li> <li>• Chapter 3 'Qualitative Explanatory Variables Regression Models in Gujarati, Econometrics by Example.'</li> <li>• Chapter 6: 'Dummy Variable Regression Models' in Essentials of Econometrics, Gujarati and Porter, 4<sup>th</sup> edition (excluding 6.7).</li> <li>• Chapter 5: 'Dummy Variables' in Introduction to Econometrics, Christopher Dougherty, 4<sup>th</sup> edition.</li> </ul>
II.iii.a	Regression Diagnostics: Detection of, and remedial measures for Multicollinearity, Autocorrelation Heteroscedasticity	<ul style="list-style-type: none"> <li>• Chapter 4 'Regression Diagnostic I: Multicollinearity',</li> <li>• Chapter 5 'Regression Diagnostic II: Heteroscedasticity'</li> <li>• Chapter 6 'Regression Diagnostic III: Autocorrelation in Gujarati, Econometrics By Example'</li> </ul>
II.iii.b	Regression Diagnostics: Model Selection	<ul style="list-style-type: none"> <li>• Chapter 13 'Econometric Modeling: Model Specification and Diagnostic Testing', Section 13.1-13.5 and 13.9-13.12 in Gujarati, Porter and Gunasekar, Basic Econometrics.</li> </ul>

III.a.	Advanced Topics in Regression Analysis: Dynamic Econometric Models	<ul style="list-style-type: none"> <li>• <i>Chapter 17 'Dynamic Econometric Models: Autoregressive and Distributed-Lag Models' in Gujarati, Porter and Gunasekar, Basic Econometrics.(except 17.9 and 17.13)</i></li> </ul>
III.b.	Advanced Topics in Regression Analysis: Instrumental Variable Estimation, Simultaneous Equations Model	<ul style="list-style-type: none"> <li>• <i>Chapter 15 'Instrumental Variable Estimation and Two Stage Least Squares', Section 15.1, 15.2 and 15.4 in Wooldridge, Introductory Econometrics.</i></li> <li>• <i>Chapter 18 'Simultaneous Equation Models' in Gujarati, Porter and Gunasekar, Basic Econometrics.</i></li> </ul>
IV.	Panel Data Models and Estimation Techniques	<ul style="list-style-type: none"> <li>• <i>Chapter 16 'Panel Data Regression Models' in Gujarati, Porter and Gunasekar, Basic Econometrics</i></li> </ul>
V.	Introduction to Econometric Software	<ul style="list-style-type: none"> <li>• <i>Chapter 19 'Carrying Out an Empirical Project', in Wooldridge, Econometrics.</i></li> <li>• <i>Relevant Instruction Manual for the Software</i></li> </ul>

### **Recommended textbooks**

1. D. N. Gujarati, D.C. Porter and Sangeetha Gunasekar, Basic Econometrics, 5th edition, McGraw Hill, 2012 Indian edition.
2. D. N. Gujarati and D.C. Porter, Basic Econometrics, 5th edition, McGraw Hill, 2012 International edition. (This text book is required only for Topic II i. - The Matrix Approach to Linear Regression Model. Readers can also refer to Gujarati and Sangeetha, Basic Econometrics, 4th edition, McGraw Hill, 2009 Indian reprint. Relevant sections to be studied are same in both text books).
3. Damodar Gujarati, Econometrics by Example, 2<sup>nd</sup> edition, Palgrave Macmillan, 2014.
4. Jeffrey M. Wooldridge, Introduction to Econometrics: A Modern Approach, 5<sup>th</sup> Edition, Cengage Learning, 2014.
5. D. N. Gujarati and D.C.Porter, Essentials of Econometrics, 4th Edition, McGraw Hill International Edition, 2010.
6. Christopher Dougherty, Introduction to Econometrics, 4th edition, OUP, Indian edition, 2011.

## **Student Assessment Summary**

Students will have to pass the end-semester exam and the total of the internal assessment and end-semester exam as per university rules to clear the paper.

The end-semester final examination will be of 75 marks. The question paper will consist of seven questions of 15 marks each from Topics I, II, III and IV only. Students will have to answer any five questions.

The software skills of the students will be tested by the teachers during internal assessment and not in the end-semester final exam. The paper setting committee should take a note of this.

Internal assessment will be of 25 marks, divided further as follows:

1. Attendance: 5 marks
2. Class Test/ Assignment: 10 marks
3. Empirical project using the econometric software learnt: 10 marks. (Projects can be done in groups of 2 or 3)