



Hunan University STAT 24: Econometrics I

Professor: To be announced

Total contact hours: 54 hours

Credit: 4

Course Description

This course provides an introduction to the basic econometric concepts, models, techniques and analysis methods that are most commonly discussed and studied in econometrics. The multiple regression models and regression analysis methods, as well as detailed practical aspects of linear regression models, dummy variables, different functional forms and the consequences of violation of the classical regression assumptions are systematically included.

Required Material

Textbook: *Basic Econometrics*

Author: Damodar N. Gujarati, Dawn C. Porter

Edition: 5th Edition

Publisher: McGraw-Hill, Irwin

Supplemental Materials:

1. *Microeconometrics: Methods and Applications*, by Colin Cameron and Pravin K. Trivedi
2. *Econometric Analysis*, by William H. Greene (5th Edition, Prentice Hall)

Grading

Assignment 1	20%
Assignment 2	20%
Participation	20%
Final Exam	40%

A+ 96-100	A 90-95	A- 85-89
B+ 82-84	B 78-81	B- 75-77
C+ 71-74	C 66-70	C- 62-65
D 60-61	F < 60	



Course Schedule

The course has 24 class sessions in total. All sessions are 2 hours and 15 minutes in length.
Note: the course outline and required readings are subject to change.

Class 1:

Introduction:

- 1.1 What is Econometrics?
- 1.2 Why a Separate Discipline?
- 1.3 Methodology of Econometrics
- 1.4 Types of Econometrics
- 1.5 Mathematical and Statistical Prerequisites
- 1.6 The Role of the Computer
- 1.7 Suggestions for Further Reading

Class 2:

Chapter 1: The Nature of Regression Analysis

- 1.1 Historical Origin of the Term Regression
- 1.2 The Modern Interpretation of Regression
- 1.3 Statistical versus Deterministic Relationships
- 1.4 Regression versus Causation
- 1.5 Regression versus Correlation
- 1.6 Terminology and Notation
- 1.7 The Nature and Sources of Data for Economic Analysis

Class 3:

Chapter 1: The Nature of Regression Analysis (Cont.)

Summary and Conclusions

Class 4:

Chapter 2: Two-Variable Regression Analysis: Some Basic Ideas

- 2.1 A Hypothetical Example
- 2.2 The Concept of Population Regression Function (PRF)
- 2.3 The Meaning of the Term Linear
- 2.4 Stochastic Specification of PRF
- 2.5 The Significance of the Stochastic Disturbance Term
- 2.6 The Sample Regression Function (SRF)
- 2.7 Illustrative Examples

Class 5:

Chapter 2: Two-Variable Regression Analysis: Some Basic Ideas (Cont.)

Summary and Conclusions



Class 6:

Chapter 3: Two-Variable Regression Model: The Problem of Estimation

3.1 The Method of Ordinary Least Squares

3.2 The Classical Linear Regression Model: The Assumptions Underlying the Methods of Least Squares

3.3 Precision or Standard Errors of Least-Squares Estimates

3.4 Properties of Least-Squares Estimators: The Gauss-Markov Theorem

3.5 The Coefficient of Determination

3.6 A Numerical Example

3.7 Illustrative Example

3.8 A Note on Monte Carlo Experiments

Class 7:

Chapter 3: Two-Variable Regression Model: The Problem of Estimation (Cont.)

Summary and Conclusions

Assignment 1

Class 8:

Chapter 4: Classical Normal Linear Regression Model (CNLRM)

4.1 The Probability Distribution of Disturbance u_i

4.2 The Normality Assumption for u_i

4.3 Properties of OLS Estimators under the Normality Assumption

4.4 The Method of Maximum Likelihood (ML)

Class 9:

Summary and Conclusions

Chapter 4: Classical Normal Linear Regression Model (CNLRM) (Cont.)

Class 10:

Chapter 5: Two-Variable Regression: Interval Estimation and Hypothesis Testing

5.1 Statistical Prerequisites

5.2 Interval Estimation: Some Basic Ideas

5.3 Confidence Intervals for Regression

5.4 Confidence Interval for σ^2

5.5 Hypothesis Testing: General Comments

5.6 Hypothesis Testing: The Confidence-Interval Approach

5.7 Hypothesis Testing: The Test-of-Significance Approach

5.8 Hypothesis Testing: Some Practical Aspects

5.9 Regression Analysis and Analysis of Variance

5.10 Application of Regression Analysis: The Problem of Prediction

5.11 Reporting the Results of Regression Analysis

5.12 Evaluating the Results of Regression Analysis

Class 11:



Chapter 5: Two-Variable Regression: Interval Estimation and Hypothesis Testing (Cont.)
Summary and Conclusions

Class 12:

Chapter 6: Extensions for the Two-Variable Linear Regression Model

6.1 Regression through the Origin

6.2 Scaling and Units of Measurement

6.3 Regression on Standardized Variables

6.4 Functional Forms of Regression Models

6.5 How to Measure Elasticity: The Log-Linear Model

6.6 Semilog Models: Log-Lin and Lin-Log Models

6.7 Reciprocals Models

6.8 Choice of Functional Form

6.9 A Note on the Nature of the Stochastic Error Term: Additive versus Multiplicative Stochastic Error Term

Class 13:

Chapter 6: Extensions for the Two-Variable Linear Regression Model (Cont.)

Summary and Conclusions

Assignment 2

Class 14:

Chapter 7: Multiple Regression Analysis: The Problem of Estimation

7.1 The Three-Variable Model: Notation and Assumption

7.2 Interpretation of Multiple Regression Equation

7.3 The Meaning of Partial Regression Coefficients

7.4 OLS and ML Estimation of the Partial Regression Coefficients

7.5 The Multiple Coefficient of Determination of R^2 and the Multiple Coefficient of Correlation R

7.6 An Illustrative Example

7.7 Simple Regression in the Context of Multiple Regression: Introduction to Specification Basis

7.8 R^2 and the Adjusted R^2

7.9 The Cobb-Douglas Production Function: More on Functional Form

7.10 Polynomial Regression Models

7.11 Partial Correlation Coefficients

Class 15:

Chapter 7: Multiple Regression Analysis: The Problem of Estimation (Cont.)

Summary and Conclusions

Class 16:

Chapter 8: Multiple Regression Analysis: The Problem of Inference

8.1 The Normality Assumption Once Again



- 8.2 Hypothesis Testing in Multiple Regression: General Comments
- 8.3 Hypothesis Testing about Individual Regression Coefficients
- 8.4 Testing the Overall Significance of the Sample Regression
- 8.5 Testing the Equality of Two Regression Coefficients
- 8.6 Restricted Least Squares: Testing Linear Equality Restrictions
- 8.7 Testing for Structural or Parameter Stability of Regression Models: The Chow Test
- 8.8 Prediction with Multiple Regression
- 8.9 The Troika of Hypothesis Tests: The Likelihood Ratio (LR), Wald (W), and Lagrange Multiplier (LM) Tests
- 8.10 Testing the Functional Form of Regression: Choosing between Linear and Log-Linear Regression Models

Class 17:

Chapter 8: Multiple Regression Analysis: The Problem of Inference (Cont.)
Summary and Conclusions

Class 18:

- Chapter 9: Dummy Variable Regression Models
- 9.1 The Nature of Dummy Variables
 - 9.2 ANOVA Models
 - 9.3 ANOVA Models with Two Qualitative Variables
 - 9.4 Regression with a Mixture of Quantitative and Qualitative Regressors: The ANCOVA Models
 - 9.5 The Dummy Variable Alternative to the Chow Test
 - 9.6 Interaction Effects Using Dummy Variables
 - 9.7 The Use of Dummy Variables in Seasonal Analysis
 - 9.8 Piecewise Linear Regression
 - 9.9 Panel Data Regression Models
 - 9.10 Some Technical Aspects of the Dummy Variable Technique
 - 9.11 Topics for Further Study
 - 9.12 A Concluding Example

Class 19:

Chapter 9: Dummy Variable Regression Models (Cont.)
Summary and Conclusions
Participation

Class 20:

- Chapter 10: Multicollinearity: What Happens If the Regressors Are Correlated?
- 10.1 The Nature of Multicollinearity
 - 10.2 Estimation in the Presence of Perfect Multicollinearity
 - 10.3 Estimation in the Presence of “High” but “Imperfect” Multicollinearity
 - 10.4 Multicollinearity: Much Ado about Nothing? Theoretical Consequences of Multicollinearity
 - 10.5 Practical Consequences of Multicollinearity
 - 10.6 An Illustrative Example



10.7 Detection of Multicollinearity

10.8 Remedial Measures

10.9 Is Multicollinearity Necessarily Bad? Maybe Not, If the Objective Is Prediction Only

10.10 An Extended Example: The Longley Data

Class 21:

Chapter 10: Multicollinearity: What Happens If the Regressors Are Correlated? (Cont.)

Summary and Conclusions

Class 22:

Chapter 11: Heteroscedasticity: What Happens If The Error Variance Is Nonconstant?

11.1 The Nature of Heteroscedasticity

11.2 OLS Estimation in the Presence of Heteroscedasticity

11.3 The Methods of Generalized Least Squares (GLS)

11.4 Consequences of Using OLS in the Presence of Heteroscedasticity

11.5 Detection of Heteroscedasticity

11.6 Remedial Measures

11.7 Concluding Examples

11.8 A Caution about Overreacting to Heteroscedasticity

Class 23:

Chapter 11: Heteroscedasticity: What Happens If The Error Variance Is Nonconstant? (Cont.)

Summary and Conclusions

Class 24:

Preparation for the final exam

Final Exam

Attending Policy

Regular and prompt attendance is required. Under ordinary circumstances, you may miss two times without penalty. Each absence over this number will lower your course grade by a third of a letter and missing more than five classes may lead to a failing grade in the course. Arriving late and/or leaving before the end of the class period are equivalent to absences.

Policy on "Late Withdrawals"

In accordance with university policy, appeals for late withdrawal will be approved ONLY in case of medical emergency and similar crises.

Academic Honesty

Hunan University expects all students to do their own work. Instructors will fail assignments that show evidence of plagiarism or other forms of cheating, and will also report the student's



name to the University administration. A student reported to the University for cheating is placed on disciplinary probation; a student reported twice is suspended or expelled.

General Expectations:

Students are expected to:

- Attend all classes and be responsible for all materials covered in class and otherwise assigned;
- Complete the day's required reading and assignments before class;
- Review the previous day's notes before class and make notes about questions you have about the previous class or the day's reading;
- Participate in class discussions and complete required written work on time;
- Refrain from texting, phoning or engaging in computer activities unrelated to class during the class period;
- While class participation is welcome, even required, you are expected to refrain from private conversations during the class period.

Special Needs or Assistance

Please contact the Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material. Our goal is to help you learn, not to penalize you for issues which mask your learning.