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Nanchang University
STAT 24: Econometrics I
(Last Updated in Jan. 2023)

Credit: 6

Contact Hours

This course is composed of 24 lecture sessions, 3 tutorial sessions and 9 office hours. Each lecture session takes 2 contact hours in length; each tutorial session takes 3 contact hours in length;There will be a Q-A review session(3 contact hours) and Final Exam (3 contact hours)at the end of this term. This course has 72 contact hours in total.

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 Textbook

Basic Econometrics by Damodar N. Gujarati, Dawn C. Porter, 5th Edition
Publisher: McGraw-Hill, Irwin

Supplemental Materials

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

Grading

- Participation and discussion 20%
- Assignment and Homework 20%
- Quizzes 20%
- Final Exam(including writing paper) 40%

Letter Grade	Grade Points
High Distinction	85-100
Distinction	75-84
Credit	65-74
Pass	50-64
Fail	0-49

Course Schedule

The course has 24 class sessions in total. All sessions are 2 contact hours in length. At the end of this term, there will be a Q-A review session(3 contact hours) and Final Exam (3 contact hours).
Note: the course outline and required readings are subject to change.

Class 1:
Introduction to the course syllabus and the textbook
Basic econometric concepts

Class 2:
The Nature of Regression Analysis
Historical Origin and the Modern Interpretation of Regression
Regression versus Causation & Regression versus Correlation
Reading: Ch.1

Class 3:
The Nature of Regression Analysis (Cont.)
Statistical versus Deterministic Relationships
The Nature and Sources of Data for Economic Analysis
Discussion and Conclusions
Reading: Ch.1

Class 4:
Two-Variable Regression Analysis: Some Basic Ideas
A Hypothetical Example; The Concept of Population Regression Function (PRF)
The Meaning of the Term *Linear*
Reading: Ch.2

Class 5:
Two-Variable Regression Analysis: Some Basic Ideas (Cont.)
Stochastic Specification of PRF; The Significance of the Stochastic Disturbance Term
The Sample Regression Function (SRF); Illustrative Examples

Discussion and Conclusions
Reading: Ch.2
Quiz 1

Class 6:
Two-Variable Regression Model: The Problem of Estimation
The Method of Ordinary Least Squares
The Classical Linear Regression Model: The Assumptions Underlying the Methods of Least Squares
Reading: Ch.3

Class 7:
Two-Variable Regression Model: The Problem of Estimation (Cont.)
Precision or Standard Errors of Least-Squares Estimates
Properties of Least-Squares Estimators: The Gauss-Markov Theorem
The Coefficient of Determination; A Numerical Example; Illustrative Example
A Note on Monte Carlo Experiments
Reading: Ch.3

Class 8:
Classical Normal Linear Regression Model (CNLRM)
The Probability Distribution of Disturbance u_i
The Normality Assumption for u_i
Reading: Ch.4

Class 9:
Classical Normal Linear Regression Model (CNLRM) (Cont.)
Properties of OLS Estimators under the Normality Assumption
The Method of Maximum Likelihood (ML)
Discussion and Conclusions
Reading: Ch.4
Quiz 2

Class 10:
Two-Variable Regression: Interval Estimation and Hypothesis Testing
Statistical Prerequisites; Interval Estimation: Some Basic Ideas
Confidence Intervals for Regression and σ^2
Hypothesis Testing:
General Comments; The Confidence-Interval Approach
The Test-of-Significance Approach; Some Practical Aspects
Reading: Ch.5

Class 11:
Two-Variable Regression: Interval Estimation and Hypothesis Testing (Cont.)

Regression Analysis and Analysis of Variance
Application of Regression Analysis: The Problem of Prediction
Reporting and Evaluating the Results of Regression Analysis
Discussion and Conclusions
Reading: Ch.5

Class 12:
Extensions for the Two-Variable Linear Regression Model
Regression through the Origin; Scaling and Units of Measurement
Regression on Standardized Variables; Functional Forms of Regression Models
Reading: Ch.6
Class 13:
Extensions for the Two-Variable Linear Regression Model (Cont.)
How to Measure Elasticity: The Log-Linear Model
Semilog Models: Log-Lin and Lin-Log Models
Reciprocals Models; Choice of Functional Form
A Note on the Nature of the Stochastic Error Term: Additive versus Multiplicative Stochastic Error Term
Reading: Ch.6

Class 14:
Multiple Regression Analysis: The Problem of Estimation
The Three-Variable Model: Notation and Assumption
Interpretation of Multiple Regression Equation; The Meaning of Partial Regression Coefficients
OLS and ML Estimation of the Partial Regression Coefficients
The Multiple Coefficient of Determination of R^2 and the Multiple Coefficient of Correlation R
Reading: Ch.7

Class 15:
Multiple Regression Analysis: The Problem of Estimation (Cont.)
An Illustrative Example
Simple Regression in the Context of Multiple Regression: Introduction to Specification Basis
R^2 and the Adjusted R^2; The Cobb-Douglas Production Function: More on Functional Form
Polynomial Regression Models; Partial Correlation Coefficients
Summary and Conclusions
Reading: Ch.7
Quiz 3

Class 16:
Multiple Regression Analysis: The Problem of Inference
The Normality Assumption ; Hypothesis Testing in Multiple Regression: General Comments
Hypothesis Testing about Individual Regression Coefficients
Testing the Overall Significance of the Sample Regression
Testing the Equality of Two Regression Coefficients

Restricted Least Squares: Testing Linear Equality Restrictions
Testing for Structural or Parameter Stability of Regression Models: The Chow Test
Reading: Ch.8

Class 17:
Multiple Regression Analysis: The Problem of Inference (Cont.)
Prediction with Multiple Regression
The Troika of Hypothesis Tests: The Likelihood Ratio (LR), Wald (W), and Lagrange Multiplier (LM) Tests
Testing the Functional Form of Regression: Choosing between Linear and Log-Linear Regression Models
Reading: Ch.8

Class 18:
Dummy Variable Regression Models
The Nature of Dummy Variables
ANOVA Models; ANOVA Models with Two Qualitative Variables
Regression with a Mixture of Quantitative and Qualitative Regressors: The ANCOVA Models
The Dummy Variable Alternative to the Chow Test; Interaction Effects Using Dummy Variables
The Use of Dummy Variables in Seasonal Analysis
Reading: Ch.9

Class 19:
Dummy Variable Regression Models (Cont.)
Piecewise Linear Regression; Panel Data Regression Models
Some Technical Aspects of the Dummy Variable Technique
Topics for Further Study; A Concluding Example
Discussion and Conclusions
Reading: Ch.9
Quiz 4

Class 20:
Multicollinearity: What Happens If the Regressors Are Correlated?
The Nature of Multicollinearity
Estimation in the Presence of Perfect Multicollinearity & “High” but “Imperfect” Multicollinearity
Multicollinearity: Much Ado about Nothing? Theoretical Consequences of Multicollinearity
Practical Consequences of Multicollinearity
Reading: Ch.10

Class 21:
Multicollinearity: What Happens If the Regressors Are Correlated? (Cont.)
An Illustrative Example
Detection of Multicollinearity; Remedial Measures

Is Multicollinearity Necessarily Bad? Maybe Not, If the Objective Is Prediction Only
An Extended Example: The Longley Data
Reading: Ch.10

Class 22:
Heteroscedasticity: What Happens If The Error Variance Is Nonconstant?
The Nature of Heteroscedasticity; OLS Estimation in the Presence of Heteroscedasticity
The Methods of Generalized Least Squares (GLS)
Consequences of Using OLS in the Presence of Heteroscedasticity
Detection of Heteroscedasticity
Reading: Ch.11

Class 23:
Chapter 11: Heteroscedasticity: What Happens If The Error Variance Is Nonconstant? (Cont.)
Remedial Measures; Concluding Examples; A Caution about Overreacting to Heteroscedasticity
Reading: Ch.11
Summary and overall review

Class 24:
Preparation for the 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

Nanchang 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.