Learning Goals

Economic Statistics

Overview

Economic statistics teaches basic statistical concepts applied to the economic theory. With the help of economic data, students will learn how to apply economic theory into the empirical data analysis. Basic probability theory and statistical theory are introduced in this class. Students need to understand the difference between random sample and population. Once random sample is drawn from the population, sample statistics and sampling distribution are introduced to make statistical inferences about the unknown population parameters.

Students will be introduced to basic statistical software such as Stata and/or Microsoft Excel to perform statistical analysis.

Specific Learning Goals

1. Random sample
   a. The difference between population and sample.
   b. What is a random sample and how to obtain random sample from the population.
2. Students will learn basic probability theory
   a. Probability of an event, probability of a union of two events, probability of an intersection of two events, and probability of two independent events.
   b. Conditional probability and Bayes’ Theorem.
3. Probability distributions
   a. Discrete probability distributions: Uniform distribution and Binomial distribution
   b. Continuous probability distributions: Normal distributions, t-distribution, F-distribution and Chi-square distribution.
4. Estimation: Sample statistics
   a. Central tendency: Sample mean, median, and mode to measure central tendency of the sample.
   b. Dispersion: Sample variance and sample standard deviations.
5. Mathematical expectation
   a. Mathematical expectation of sample statistics
   b. Biasedness of an estimate.
6. Sampling distribution of sample statistics
   a. Finite sample distribution: Normal distribution and t-distribution depending on the sampling assumptions. F-distribution and Chi-square distribution are also introduced.
7. Statistical inferences
a. Once sampling distribution of sample statistics is obtained, students will learn how to make statistical inferences such as hypothesis testing and confidence interval constructions.

b. Various test statistics are introduced: z-test, t-test, F-test and Chi-square test statistics.

c. Hypothesis testing: Students will learn how to formulate the null hypothesis and alternative hypothesis, and obtain test statistics to test the hypothesis.

d. Confidence interval: interval estimate of the unknown population parameters.

8. Inferences on more than two populations
   a. Comparison of means for two or more populations.
   b. Chi-square test: Test of statistical independence of two or more populations.

9. Linear regression: Toward the end of the semester, if time permits, linear regression model will be introduced with Gauss-Markov assumptions. This will make a smooth transition to Econometrics in the following (or later) semester.

10. Computer skills: For any modern statistics class, it is essential that students are able to perform statistical analysis by themselves. Students need to learn statistical software to achieve this goal. Basic statistical software such as Stata and/or Microsoft Excel will be taught in the class. This skill will greatly enhance students’ job marketability for internships and permanent employment.