

Econometrics: Lecture 1

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Econometrics

Econometrics is the application of statistical methods to economic data in order to give empirical content to economic relationships.

Econometrics VS Economy

Economics suggests important relationships, often with policy implications, but virtually never suggests quantitative magnitudes of causal effects.

Typical Econometrics Questions

- What is the quantitative effect of reducing class size on student achievement?
- How does another year of education change earnings?
- What is the price elasticity of cigarettes? (How to estimate demand curve or supply curve)
- Increase the alcohol tax could reduce traffic death? If so, how much?
- The effect of law enforcement on city crime level?
- Allow people carry gun increase or decrease the city crime level?
- Does GDP growth affect Democracy or vice versa or uncorrelated?
- The effect of Women's fertility rate on labor supply?

AI, Machine Learning, Data Science VS Econometrics

Similarity

All use certain algorithm for processing the data to predict some variable as a function of other variables.

AI, Machine Learning etc.

- Data size is huge. Data object is usually image, audio, video etc
- May or may not care about the patterns or insight of the algorithm(estimation model) itself
- May or may not care about inference—how credible y changes as some x changes

Econometrics

- Data size is small. Usually economic, financial object
- Hope for some sort of insight from the estimation model
- In particular, inference and causal inference is goal for decision making

Causality Inference

Random Controlled Experiment

Experiments designed to evaluate a treatment or policy or to investigate a causal effect

- Control Group
- Treatment Group

Inference from Observational Data Source

Use statistical methods for prediction, inference, causal modeling of economic relationships.

- Cross Sectional Data
- Time Series Data
- Panel Data

Definition (Ceteris paribus)

Ceteris paribus or caeteris paribus is a Latin phrase meaning "other things equal" .

If Czech history could be repeated, we should of course find it desirable to test the other possibility each time and compare the results. Without such an experiment, all considerations of this kind remain a game of hypotheses
–Milan Kundera

Experiment for Econometrics



Learning Goals

- Learning the Prob/Stat/Econometrics Theory
- Understanding the Rational behind these theory. (intuitive example and cold-hearted math proof)
- Learn how to code in R
- Learn how to implement the Prob/Stat/Econometrics theory through R

How to Thrive In This Class

- Take notes or rewatch the recorded video to review the material after class. Run the R demo code yourself. Compare the econometrics/stat theory with the code. You will familiarize the syntax and structure of R by first reading the code of the other's. Then emulate it and try to work out your own code.
- R Demo code will be illustrated in detail in class. You will need to use some of these code to solve the assignment questions. R Demo also provide you with another perspective to review the theory on slides. If you have any questions regarding to the slides, R demo, feel free to drop by my office hour or ask me after class.
- All the assignments will be graded and counted into the overall grade. For the fairness of the grading policy, I won't answer any question directly related to the questions of assignment prior to the due date.
- Attending the class and actively participate in the class discussion is highly recommended and encouraged.