

Introductory Econometrics

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What is Econometrics?

Answer 1: Statistics

The goal of econometrics is just to use data to make inference about economic phenomena

Econometrics is just the statistics that economists typically use

Answer 2: Combine Statistical Techniques with Economic Theory

Econometric analysis is often much more ambitious than simple statistical analysis using stronger assumptions and yielding stronger predictions

One can divide the type of questions and analyses that economists typically perform into three basic types:

- ① Descriptive
- ② Forecasting
- ③ Causal (or structural)

Let me describe each type

Descriptive Questions

- How much do men and women earn annually on average in the United States?
- How long do recessions typically last?
- How do interest rates and the Stock Market move together?
- How does medical insurance coverage vary with Income?

In some ways descriptive questions are the easiest to answer in the sense that if we had enough data we would know the answer.

There are really two challenges for the econometrician here:

- Sampling

We typically do not observe the full population but rather a sample. We want to make inferences about the population based on the sample

- Summary Statistics

Often the data for some of these questions is complicated and we need to find a nice way to summarize it (for example the relationship between medical insurance and income).

Forecasting Questions

- Who will win the super bowl?
- How long will the recession last this year?
- What will the stock price of Google be on Oct. 14?
- Will you pass this course?
- How much revenue will my firm generate next year?
- What will the global temperature be in 2020?

These are all different questions that we can never know exactly until they happen

However, once they do happen we will know the answer

However we want to get some idea of what is likely to happen.

Some times there are very high stakes to this: if you can only predict the stock market a little bit you can potentially make a lot of money.

There is an art to doing this, there are two basic tradeoffs:

- Having a model that doesn't explain the current data too well
- Having a model that explains the current data too well

Causal Questions

- If the federal reserve lowers interest rates today, what will happen to inflation tomorrow?
- How much more money will you earn as a result of taking this course?
- Will spending a lot of money on highway construction get us out of the recession?
- If I drink more red wine what will happen to my chances of having a heart attack?
- If handguns became illegal, what would happen to homicide rates?

We will spend the most time in this course thinking about these kinds of issues

In the physical sciences one can often answer this type of question by running an experiment

However, for both practical and ethical reasons it is typically hard to run experiments in the Social Sciences

This is the main reason econometrics is useful

We generally will never know the answer to these questions without running an experiment

Econometrics rarely “solves” causal problems, however it is very useful for help us understand them

One nice way to think about the difference between these three types of analysis:

Descriptive: If we had enough data we would know the answer.

Forecasting: If we wait long enough and have enough data, we would know the answer.

Causality: Unless we can run the perfect experiment, we will never know the answer for sure.