

What is Econometrics?

- Econometrics is a subset of statistics
- Science of testing economic theories
- Used to estimate causal effects
- Used to forecast or predict (not covered in this course)
- Often characterized by “observational data”

Causal Effects

Economic models often suggest that one variable causes another. This often has *policy implications*. The economic models, however, do not provide *quantitative magnitudes* of the causal effects.

For example:

- How would a change in the *price* of alcohol or cigarettes effect the *quantity* consumed?
- If *income* increases, how much of the increase will be *consumed*?
- If an additional *fireplace* is added to a house, how much will the *price* of the house increase?
- How does another year of *education* change *earnings*?

Using data to estimate causal effects

An experiment would be best.

- How would you determine the effect of fertilizer on crop yield?
- How would you use an experiment to determine the above four causal effects (on the previous slide)?
- What is the advantage of experiments?

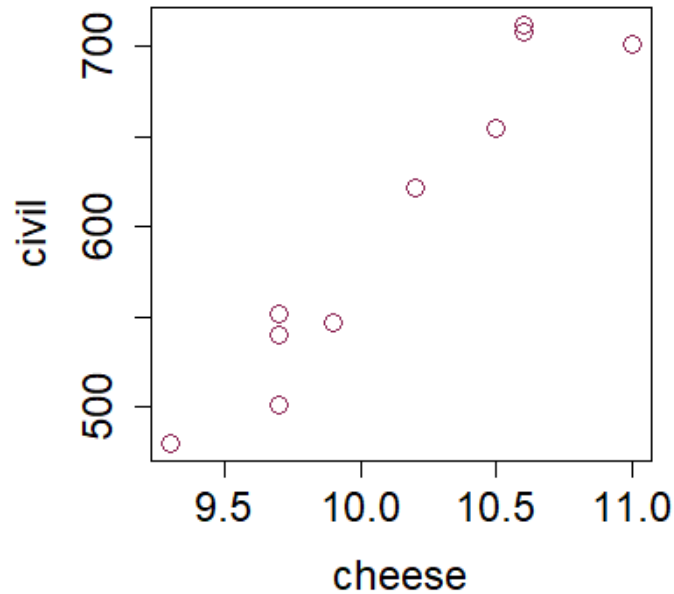
Economic experiments are usually unethical and/or too expensive.

We usually don't have *experimental* data in econometrics – we have *observational* data.

There are issues when dealing with observational data:

- Omitted variables
- Simultaneous causality
- Correlation vs. causation

Civil engineering PhDs awarded, and per-capita consumption of cheese, from 2000-2009 in the U.S. (Spurious correlations, Tyler Vigen)



Objectives of this course

- Learn a method for estimating causal effects (OLS)
- Understand some theoretical properties of OLS
- Learn about hypothesis testing
- Learn to read regression analyses, to understand empirical economics papers in other courses
- Practice OLS using data sets

R and R Studio

For data analysis, we will use *R Studio*. Next class I will show you how to download and install *R* and *R Studio*.