Fundamentals of Econometrics

Lecture 8: Pooling Cross Sections across Time: Simple Panel Data Methods

Simple Panel Data Methods

Panel Data

- Panel data is a combination of time series and cross-sectional data.
- It consists of observations on multiple entities (individuals, firms, countries, etc.) over multiple time periods.
- To gather a panel data set, we can either:
  - Collect data on the same individuals over time (e.g., a survey of the same individuals at different points in time).
  - Collect data on different individuals at different points in time (e.g., a survey of different individuals at different points in time).

Independently Pooled Cross Sections

- Collection of independent, random samples from the same population at multiple periods of time.

Some Data Sources

- The Panel Study of Income Dynamics (PSID): Collected by the

Policy Analysis with Pooled Cross Sections

Natural or Quasi-Experiments

- A natural experiment is when an exogenous shock occurs to a system and affects individual behavior.
- We have a group of individuals affected by the shock and a group of individuals that are not. So this is similar in principle to a laboratory experiment where there is a treatment group (affected by shock) and control group (not affected by shock).
- A quasi-experiment is when a researcher uses a natural experiment to estimate the effect of a treatment on an outcome.

Two requirements:

- Two time periods (one before and one after the policy change)
- Two groups (treatment and control)

Natural Experiment Framework

Goal: To determine differences between treatment and control groups due to an exogenous shock.

Advanced Panel Data Methods

Will move to a different chapter.

Panel Data (Motivation)

```
lm(crmrte ~ unem, data = crime2,
   subset = c(year == 87)) |> summary() |> coef()
```

```
##                Estimate Std. Error t value Pr(>|t|)
## (Intercept)    128.38      20.76     6.18  1.8e-07
## unem            -4.16       3.42    -1.22  2.3e-01
```

Takeaways

- Interpreting this simple regression model causally, we get that a 1% increase in the unemployment rate will *lower* the crime rate by 4.16%.