EC 421

Midterm Topics

Spring 2020

Note: In general, you do not need to memorize proofs. Just understand the steps. I might ask how you get from one step to the next. I won't ask you to write down a full proof.

Slide Set 1: Intro

- The goal of econometrics
- Regression notation
- Basic concept of causality

Slide Set 2: Review I

- Population vs. sample
  - Parameters vs. sample estimates
  - Estimators and uncertainty
- Uncertainty
  - Standard errors
  - Hypothesis testing
  - t tests
  - F tests
  - Forming hypotheses
  - critical value
  - p-value
  - Confidence intervals
- Linear regression and OLS
  - "Best-fit" line
  - Residuals
  - SSE
  - Estimators: bias and variance
  - Statistical inference
  - Variance (and standard error) of the OLS estimator
  - Regressions with R's `lm` function

Slide Set 3: Review II

- Simple and multiple linear regression
- Model fit
  - R squared
  - Overfitting
  - Adjusted R squared
- Omitted-variable bias
- Interpreting coefficients
  - Simple linear regression
  - Multiple linear regression (ceterus paribus)
  - Continuous explanatory variables
  - Categorical explanatory variables
  - Interactions
  - Specifications
  - Linear-linear
  - Log-linear
  - Log-log
- Inference vs. prediction

Slide Set 4: Heteroskedasticity

- The meaning of each of our assumptions/requirements
- Heteroskedasticity
  - What it is
  - What it looks like
  - Consequences for OLS
- Tests for heteroskedasticity
  - Goldfeld-Quandt test
  - Breusch-Pagan test
  - White test
  - Chi-squared distribution
  - Null and alternative hypotheses of each test
  - Interpretations/conclusions for each
  - Strengths and weaknesses of each test

Slide Set 5: Living with Heteroskedasticity

- Misspecification
- Weighted least squares
- Heteroskedasticity-robust standard errors

Slide Set 6: Asymptotics and Consistency

- Asymptotics
  - Compared to 'finite-sample' attributes (probability limits vs. expected values)
  - Probability limits
- Consistency
- Signing the bias from omitted variables.
- Measurement error and attenuation bias.
- Examples of measurement error