EC 421

Midterm Topics

07 February 2019

Slide Set 1: Intro

- The goal of econometrics
- Regression notation
- Causality

Slide Set 2: Review I

- Population vs. sample
    - Parameters vs. sample estimates
    - Estimators and uncertainty
- Uncertainty
    - Standard error
    - 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

Slide Set 7: Time Series

- Notation
- Assumptions
- Static models
- Dynamic models
    - With lagged explanatory variables
    - Autoregressive, distributed lag (ADL) models
    - ADL(p,q)
    - Long-run vs. short-run effects
    - Partial-adjustment model

Proofs/derivations you do not need to 'know'

- Measurement error
- The heteroskedasticity-robust standard errors
- Equilibrium time-series model

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.