Introductory Econometrics
Midterm2 - Review

Xiaoxia Shi

University of Wisconsin - Madison

11/11/2010

Asymptotics

- Small Sample Properties vs. Large Sample Properties

- Why do we need large sample theory?

- Converge in probability (plim)

.

Asymptotics

- Law of Large Numbers

- Central Limit Theorem

- Consistency and Asymptotic Normality of OLS Estimators

.

Asymptotics

- t-test in large samples

- F-test in large samples

- LM test

.

Dummy Variables

- What are dummy variables?

- Using Dummy Variables as regressors

- Using multiple dummy variables and using interactions

.

Dummy Variables

- How do we use categorical data in the regressors?

- How do we use ordinal data in the regressors?

- When do we might need to discretize a continuous random variable?

.

Dummy Dependent Variables

- Linear Probability Model (LPM)

- How to interpret the coefficients in a LPM?

- What are the main drawbacks of LPMs? What are the solutions to them?

- What's the conditional variance of the error term in a LPM?

.

Nonlinear Probability Models

$$\Pr\left(Y = 1 | X\right) = \Phi\left(\beta_0 + \beta_1 X_1 + ... \beta_K X_K\right),$$

where Φ is a cumulative distribution function.

- Probit, logit

- For probit, $\Phi\left(t\right) = \int_{-\infty}^{t} \frac{1}{2\pi} e^{-x^2/2} dx$, and $\frac{\partial \Phi(t)}{\partial t} = \frac{1}{2\pi} e^{-t^2/2}$.

- What's the marginal effect of X_1 on $\Pr\left(Y = 1 | X\right)$?

.

Heteroskedasticity

- Heteroskedasticity is a violation of ? assumption.
- Under heteroskedasticity, are the OLS estimators still
  - unbiased?
  - consistent?
  - asymptotically normal?
  - $\sqrt{n}(\hat{\beta}_j - \beta_j)$ has asymptotic variance $\frac{\sigma^2}{SST_{x_j}(1-R_j^2)}$?
  - BLUE?
  - Efficient?

.

Heteroskedasticity

- Using the robust standard error, we have

$$\frac{\hat{\beta}_j - \beta_j}{r\_s.e.\left(\hat{\beta}_j\right)} \overset{a}{\sim} ?$$

.

Heteroskedasticity

- Testing for Heteroskedasticity

- BP test

- White test

.

Heteroskedasticity

- What's the purpose for correcting for heteroskedasticity.

- If we know that $E\left(u_i^2|X_i\right) = h\left(X_i\right)$, where h is known, how do we correct for heteroskedasticity.

- If we don't know the form of heteroskedasticity, how do we correct for heteroskedasticity?

- Why should we still use the robust standard error after correcting for heteroskedasticity?

.

Endogeneity

- What's endogeneity?

- If a regressor is endogenous, the OLS estimators are

  - unbiased?

  - consistent?

.

Endogeneity

- What are the main causes of endogeneity?

- What to do to alleviate the problem of misspecified function form?

- What to do to alleviate the problem of omitted variables?

- \What are the two requirements for proxy variables?

.

Measurement Error

- The classical measurement error assumption

- Using noisy measures as dependent variables.

- Using noisy measures as regressors

- Attenuation bias

.

Instrumental Variables

- When do we want to use instrumental variables?

- Two requirements on IVs

- What are the 2 stages in 2SLS?

.