Lab Session: Endogeneity

Sources of Endogeneity

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(review notes from POLS602, too)

Omitted Variable Bias

Linear Model

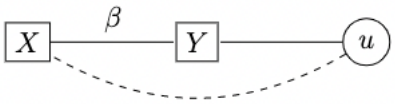

Figure 1: General

Suppose there is a third variable, X_2, which causes omitted variable bias if not included in the model. Draw X_2 in the figure below.

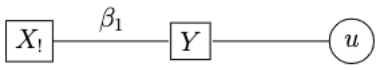

Figure 2: X2 omitted

Nonlinear model

The true model (DGP)

$$y* = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + u$$

Say we only included x_1. What is the estimated coefficient of β_1?

Solutions

- Model-specific
  - Linear models:
  - Poisson:
  - Duration:
- General

Measurement Error

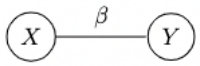

Figure 3: Measurement error

takeaway?

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Classical measurement error (in predictors)

- what is classical measurement error
- What are the consequences of classical measurement error?
- Suppose we know that x_1 and y are measured without error. If we are only concerned with hypothesis testing of the coefficient of x_1, should we be worried about measurement error?

Systematic Error (in predictors)

- Definition:
- What are the examples of systematic error?

Classical measurement error in the outcome

The consequence?

Error in the predictor (discrete outcome)

- what happens to the coefficients? attenuation.
- For covariates measures with error and without error, how are marginal effect estimates affected?

Coefficients tend to be biased downward. Impact marginal effect estimats for covarites measured both with error and not. this is because in marginal effect, $f(x\hat{\beta})\hat{\beta}$, even if $\hat{\beta}$ is not biased, $f(x\hat{\beta})$ can be biased because of bias in other $\hat{\beta}$.

Error in the outcome (discrete outcome)

- what happens to coefficients and marginal effect estimates?

Solutions:

SIMEX and overimputation.