

Problem Set 1 (corrected)

Due Friday, September 12

1. Prove that replacing X with \hat{X} in $(\hat{X}'X)^{-1}\hat{X}'y$ gives the 2SLS estimator.
2. Consider the following structural model

$$y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + u_i$$

where x_{1i} is exogenous and x_{2i} is endogenous. Let z_{1i} and z_{2i} be instruments for x_{2i} . Define the matrix Z as *all* of the exogenous variables.

Prove that regressing X on Z produces a matrix, where the first column is a vector of ones, the second column is x_{1i} , and the 3rd column is the fitted values from a regression of x_{2i} on a constant, x_{1i} , z_{1i} , and z_{2i} .

3. Consider the following structural regression model:

$$y = X\beta + u = X_1\beta_1 + X_2\beta_2 + u$$

Suppose that X_1 is exogenous, and X_2 is endogenous. Prove that the OLS estimator of β_1 is inconsistent, even though X_1 is exogenous.

4. Consider the structural model:

$$y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \beta_3 x_{3i} + u_i$$

where x_{1i} and x_{2i} are exogenous and x_{3i} is endogenous. Let z_{1i} , z_{2i} , and z_{3i} be candidate instruments for x_{3i} .

Using the data in iv.wf1, do the following in Eviews:

- a. Compute the 2SLS estimates and covariance matrix of β .
- b. Compute the 2SLS estimates and covariance matrix via 2 separate stages of OLS. Verify that the point estimates are the same, but that the standard errors are different than in part a.
- c. Test whether or not x_{3i} is endogenous. Report and interpret your results.
- d. Are there overidentifying restrictions? If so, how many? Test the overidentifying restrictions. Report and interpret your results.