

Exam will be in E51-151 at 12:30pm.

- 3 questions - do 2 of them
- 4 parts to each question
- Make sure to answer as much as you can, so you can get partial credit.

- With weak instruments, 2SLS is biased towards OLS
- Weak instruments produce downward biased std errors, which might make you think you are doing okay.

◦ What if you have an "instrument" s.t. $\text{plim} \frac{W' \epsilon}{T}$ is small?

$$\text{plim} [\hat{\beta}_{2SLS} - \beta] \approx \frac{\sigma_{W \epsilon}}{R^2 \sigma_{y_2 y_2}}$$

◦ still need that W is correlated with y_2 .

◦ $cp = \frac{nR^2}{1-R^2}$ unbiased estimator of cp is $\frac{nR^2 - k}{1-R^2}$

◦ OLS does better than 2SLS if ρ and R^2 are both small. (In terms of MSE).

◦ Since 2SLS is biased towards OLS, and by construction, OLS minimizes sum of squared residuals, $\hat{\sigma}_{2SLS}^2$ will be downward biased.

$$\begin{aligned} \circ \hat{V}(\hat{\delta}_{2SLS}) &= \hat{\sigma}_{\varepsilon\varepsilon}^2 (X_1' P_Z X_1)^{-1} \\ &= \frac{\hat{\sigma}_{\varepsilon\varepsilon}^2}{n R^2 \text{var}(y_2)} \end{aligned}$$

$\Rightarrow W = \frac{\hat{\varepsilon}' P_Z \hat{\varepsilon}}{\hat{\sigma}_{\varepsilon\varepsilon}}$ will be upward biased.
(biased toward rejection.)

Can use OIV on the entire system of equations if you have conditional heteroskedasticity.

• all equations just identified

$$\circ 2SLS \equiv 3SLS \equiv FIML \equiv LIML \equiv ILS \quad \text{eqn by eqn}$$

• First eqn. overid, others justid.

• Estimation of first equation, $2SLS \equiv 3SLS$

• $y_1 = X_1 \delta_1 + \varepsilon_1$ } just id \Leftrightarrow limited information

$$\circ \bar{Y}_2 = Z \Pi_2 + v_2$$

• For eqns 2-M, $V(3SLS) \leq V(2SLS)$
= if Σ is diagonal

$$\circ \hat{\varepsilon} = Z\alpha + v$$

$$\Rightarrow NR^2 \sim \chi_{k-r_1+s_1}^2$$

• jhaus@yahoo.com - have paper topic by Dec. 1st.