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Econometrics

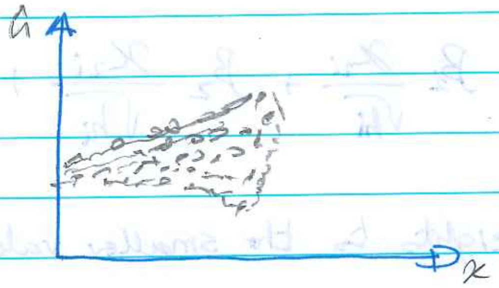
Review
Example
Het-robust method
LPM
FF Misspec
BESET Test
Non-nested alternative
Davidson-Mackinnon.

$Var(u_i | x_i) = \sigma^2$

$Var(\hat{\beta}_1) = \frac{\sigma^2}{SST_x}$ $Var(\hat{\beta}_j) = \frac{\sigma^2}{SST(1-R^2)}$

$\therefore$ OLS is BLUE

$\Rightarrow Var(u_i | x_i) = \sigma_i^2$



Detection
1. Visual
2. Formal Test → BP (Pagan)
3. LPM (By definition)
$\bar{y} = \beta_0 + \beta_1 \bar{x} + \bar{u}$

- $\hat{u}^2$ is taken as a measure of variance

(Pagan) $\Rightarrow$ $\cancel{\hat{u}^2 = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + u}$ (BP-test)

$$\hat{u}^2 = \delta_0 + \delta_1 x_1 + \delta_2 x_2 + u$$

$$H_0: \delta_1 = 0 , \delta_2 = 0$$

Problem: Takes only the Linear dependence $\Rightarrow$ Use White's Test

$$F = \frac{SSR_r - SSR_u}{SSR_u} \cdot \frac{n-5-1}{5}$$

(+) $\cdot\ nR^2_{\hat{u}^2} \sim \chi^2_5$ (How do we test for chi-squared distribution)

Problem: Too many explanatory variables

Solution: Use $\hat{u}^2 = \delta_0 + \delta_1 \hat{y} + \delta_2 \hat{y}^2 + v$

Correcting het. $Var(u_i | x_i) = \sigma^2 h_i(x)$ (h_i can be any function)

WLS/GLS

$$\Rightarrow \frac{y}{\sqrt{h_i}} = \beta_0 \cdot \frac{1}{\sqrt{h_i}} + \beta_1 \frac{x_{1i}}{\sqrt{h_i}} + \beta_2 \frac{x_{2i}}{\sqrt{h_i}} + \frac{u_i}{\sqrt{h_i}}$$

By dividing to give more weights to the smaller value of x.

In FGLS, we estimate the h_i

(+) File append

FGLS

reg y x_1 x_2

$\hat{u} \to \hat{u}^2 \longrightarrow \ln(\hat{u}^2)$

reg $\ln(\hat{u}^2)$ x_1 x_2

predict ghat

hhat = exp(ghat)

reg $\dfrac{y}{\sqrt{\hat{h}_i}}$ $\dfrac{x_1}{\sqrt{\hat{h}_1}}$ $\dfrac{x_2}{\sqrt{\hat{h}_1}}$ F Put ~~the~~ in test gives an error

- To see visually, we can also plot absolute residuals against the x_i's.

- reg y x1 x2 [aweight = $1/h_i$], robust

- Robust gives us smaller significance

Robust Variance

$$\hat{Var}(\hat{\beta}_1) = \frac{\sum (x_i - \bar{x})^2 \hat{u}_i^2}{SST_x^{\,2}} = \frac{\sum \hat{r}_i^2 \hat{u}_i^2}{SSR^2}$$

- FGLS is not unbiased due to the weights assigned etc.

$\Longrightarrow$ FGLS with robust gives the best result.

GLS (LPM)

- reg y x_1 x_2
- predict yhat
- gen h_i = (yhat*(1 - yhat))^(1/2)
- reg y x_1 x_2 [aweight = 1/h_i]

AS $\longrightarrow$ reg y x_1 x_2, robust

Functional Form Misspecification (F.F.M.)

When our dependant variables are not in the desired form. Hence FFM is a form of O.V.B.

$\Rightarrow$ We can use the RESET to come over F.F.M.

RESET:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_1^2 + \beta_4 x_2^2 + \beta_5 x_1 x_2 + u$$

$$H_0 : \beta_3 = \beta_4 = \beta_5 = 0$$

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \delta_1 \hat{y}^2 + \delta_2 \hat{y}^3 + v$$

In STATA, ~~$y = \beta_0 + \beta_1 x_1 +$~~

- reg y x_1 x_2
- ovtest