Econometrics (14/April) Chow Test

Difference-in-Difference

$$y = \alpha_0 + d(\beta_0) + \mu$$
$$= \alpha_0 + \delta_0 d + \mu$$

$$E(y|d=0) = \alpha_0 + \mu$$
$$E(y|d=1) = \alpha_0 + \delta_0 + \mu$$

$$\delta_0 = E(y|d=1) - E(y|d=0)$$

⊙ Base group is the one for which dummy variable is not included.

Now, $y = \alpha_0 + \alpha_1 X + \mu$ → edu (Female) (For male) $y = \beta_0 + \beta_1 X + \mu$

$$y = \alpha_0 + \alpha_1 X + d(\beta_0 + \beta_1 X) + \mu$$
$$= \alpha_0 + \alpha_1 X + \delta_0 d + \delta_1 (d \times X) + \mu$$

$$E[y|d=0] = \alpha_0 + \alpha_1 X + \mu$$

$$E[y|d=1] = (\alpha_0 + \delta_0) + (\alpha_1 + \delta_1) X + \mu$$

$[\beta_n = \alpha_n + \delta_n]$

Chow Test

Look for the ~~sign~~ SSR of the restricted/unrestricted model.

Restricted Model: $y = \alpha_0 + \alpha_1 x_1 + \alpha_2 x_2 + \mu$ ⟹ SSR_R

(Pooled Model)

Unrestricted Model: Added Model

$$F = \frac{[SSR_R - [SSR_1 + SSR_2]]/k+1}{[SSR_1 + SSR_2]/(N-2(k+1))}$$

(Chow Test)

Also used for Structural Change

We can set $d=1$ to study the effect of a transition, such as setting $d=1$ for events after the financial crises

STATA:

testparm d dx1 dx2

Gender	Race
F	W
M	B

$$y = \alpha_0 + \delta_0 M + \lambda_0 W + u$$

Interaction b/w Dummy Variables

$$y = \alpha + \beta M + \gamma W + \delta MW + u$$

	W	B	
M	$\alpha+\beta+\gamma+\delta$	$\alpha+\beta$	$\gamma+\delta$
F	$\alpha+\gamma$	α	
	$\beta+\delta$	β	δ

→ Difference-in-Difference