Econometrics

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Review

- Hedonic regression
- Standardized beta coefficient
- "Bad" controls
- Residual analysis
- Dummy Variable

$$y = \beta_0 + \beta_1 x_1 + \beta x_2 + \beta_3 (x_1 x x_2) + \varepsilon$$

$$\frac{\Delta y}{\Delta x_1} = \beta_1 + \beta_3 x_2$$

By plugging $\bar{x}_2$ we will get the return for fixed experience.

$$y = \alpha_0 + \alpha_1 x_1 + \alpha_2 x_2 + \alpha_3 (x_1 - \mu_1)(x_2 - \mu_2) + \varepsilon$$

$$\alpha_3 = \beta_3$$

$$\alpha_1 = \beta_1 + \beta_3 \mu_2$$

$$\alpha_2 = \beta_2 + \beta_3 \mu_1$$

(Reparameterization)

OVB

$$y = \beta_0 + \beta_1 x_1 + \beta_3 (x_1 x_2)$$

∴ It means we are saying that x_1 has no impact but the interaction b/w x_1 and x_2 has an impact. This is a logical inconsistency.

When we have three variables,

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_1 x_2 x_3 + \beta_5 x_1 x_2 + \beta_6 x_2 x_3 + \beta_7 x_3 x_1$$

⊙ Interpretation of β_3 ('individual interaction'):

~~It is the effect of~~ It is the joined effect of x_1 and x_2 that goes beyond their individual effects.

⊙ There is no relation b/w corr $x_1 x_2$ and β_3

Hedonic Regression

When the value is determined in terms of the value of the components.

When we write,

$$y = \beta_0 + \beta_1 x_1 + \dots + \beta_k x_k + u$$

- The problem with Log is that as a variable might take a zero value.

Standardized Beta Variables

$$X \longrightarrow \frac{X - \bar{X}}{\sigma_X}$$

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

$$\bar{y} = \beta_0 + \beta_1 \bar{x}_1 + \beta_2 \bar{x}_2 + \bar{u}$$

$$\frac{y - \bar{y}}{\sigma_y} = \left(\frac{\sigma_{x_1}}{\sigma_y}\right)\beta_1 \left(\frac{x_1 - \bar{x}_1}{\sigma_{x_1}}\right) + \left(\frac{\sigma_{x_2}}{\sigma_y}\right)\beta_2 \left(\frac{x_2 - \bar{x}_2}{\sigma_{x_2}}\right) + \frac{(u - \bar{u})}{\sigma_y}$$

$$z_y = \beta_1 \left(\frac{\sigma_{x_1}}{\sigma_y}\right) z_{x_1} + \beta_2 \left(\frac{\sigma_{x_2}}{\sigma_y}\right) z_{x_2} + u'$$

$$z_y = b_1 z_1 + b_2 z_2 + u'$$

~~The~~ ⊙ reg price bdrms lotsize, beta

⇒ betas are reported on the right.

∴ Hence beta are the coefficient on the standard deviation change.

'Bad' Control

- "Asset" is a bad control as it already depends on other variables.

Residual Analysis

- We should buy the house with the biggest negative residual.

⇒ We can point-out under- and over-priced assets.