The Log-Linear Model

$$\ln Y = \beta_1 + \beta_2 \ln X$$

$$\frac{1}{Y}\frac{dY}{dX} = \frac{\beta_2}{X}\frac{dX}{dX}$$

$$\beta_2 = \frac{X}{Y}\frac{dY}{dX} = \frac{dY/Y}{dX / X} = elasticity$$

Semilog models

$$\ln Y = \beta_1 + \beta_2 X$$

$$\frac{1}{Y}\frac{dY}{dX} = \beta_2$$

$$\beta_2 = \frac{dY/Y}{dX}$$

$$\beta_2 = \frac{relative\ change\ in\ regressand}{absolute\ change\ in\ regressor}$$

β_2 *is known as the semielasticity of Y with respect to X*

$100 * \beta_2$ *is known as the semielasticity of Y with respect to X*

$$Y = \beta_1 + \beta_2 \ln X$$

$$\frac{dY}{dX} = \beta_2 \frac{1}{X}$$

$$\beta_2 = \frac{dY}{dX / X}$$

The absolute change in Y for a percentage change in X

If $\Delta X / X$ changes by 0.01 unit or 1%, the absolute change in Y is $0.01 * \beta_2$

Reciprocal model

$$Y_i = \beta_1 + \beta_2 \left(\frac{1}{X}\right)$$

$$\frac{dY}{dX} = -\beta_2 \left(\frac{1}{X^2}\right)$$

if β_2 is positive, the slope is negative throughout

β_2 is negative, the slope is positive throughout