Datos $(X_1, Y_1), \ldots, (X_n, Y_n)$

Estimadores

$$\widehat{\beta}_0 = \overline{Y} - \widehat{\beta}_1 \overline{X},$$

$$\widehat{\beta}_1 = \frac{\sum_{i=1}^n \left(X_i - \overline{X}\right)\left(Y_i - \overline{Y}\right)}{\Delta_X}, \qquad \text{donde } \Delta_X = \sum_{i=1}^n \left(X_i - \overline{X}\right)^2$$

$$\widehat{\sigma}^2 = S^2 = \frac{1}{n-2} \sum_{i=1}^n \left(Y_i - \left(\widehat{\beta}_0 + \widehat{\beta}_1 X_i\right)\right)^2.$$

Distribuciones muestrales: bajo los supuestos del modelo,

$$\widehat{\beta}_0 \sim N\left(\beta_0, \sigma^2\left(\frac{1}{n} + \frac{\overline{X}^2}{\Delta_X}\right)\right), \qquad \widehat{\beta}_1 \sim N\left(\beta_1, \frac{\sigma^2}{\Delta_X}\right)$$

y además

$$\frac{\widehat{\beta}_0 - \beta_0}{\sqrt{\widehat{\sigma}^2\left(\frac{1}{n} + \frac{\overline{X}^2}{\Delta_X}\right)}} \sim t_{n-2}, \qquad \frac{\widehat{\beta}_1 - \beta_1}{\sqrt{\frac{\widehat{\sigma}^2}{\Delta_X}}} \sim t_{n-2}$$

Predicción

$$\widehat{Y}_h \sim N\left(\beta_0 + \beta_1 X_h, \sigma^2\left(\frac{1}{n} + \frac{\left(X_h - \overline{X}\right)^2}{\Delta_X}\right)\right)$$

$$Y_h - \widehat{Y}_h \sim N\left(0, \sigma^2\left(1 + \frac{1}{n} + \frac{\left(X_h - \overline{X}\right)^2}{\Delta_X}\right)\right)$$

y además

$$\frac{\widehat{Y}_h - (\beta_0 + \beta_1 X_h)}{\sqrt{\widehat{\sigma}^2\left(\frac{1}{n} + \frac{\left(X_h - \overline{X}\right)^2}{\Delta_X}\right)}} \sim t_{n-2}, \qquad \frac{Y_h - \widehat{Y}_h}{\sqrt{\widehat{\sigma}^2\left(1 + \frac{1}{n} + \frac{\left(X_h - \overline{X}\right)^2}{\Delta_X}\right)}} \sim t_{n-2}$$

Regresión inversa - Calibración

$$\frac{\widehat{X}_{nue} - X_{nue}}{\sqrt{\frac{\widehat{\sigma}^2}{\widehat{\beta}_1^2}\left(1 + \frac{1}{n} + \frac{\left(\widehat{X}_{nue} - \overline{X}\right)^2}{\Delta_X}\right)}} \overset{a}{\sim} t_{n-2}$$