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Berkeley Example: ~ Program

Fitted model: π = probability of admission

$$\log\left(\frac{\hat{\pi}}{1-\hat{\pi}}\right) = 0.589 - 0.053B - 1.204C - 1.234D - 1.669E - 3.264F$$

↑ estimated log-odds of admission

where $P = \begin{cases} 1 & \text{Program } P \\ 0 & \text{else} \end{cases}$

where $P = B, C, D, E, F$

$$\underset{6\times 1}{\hat{\beta}} = \begin{bmatrix} \hat{\beta}_0 \\ \hat{\beta}_1 \\ \hat{\beta}_2 \\ \hat{\beta}_3 \\ \hat{\beta}_4 \\ \hat{\beta}_5 \end{bmatrix}$$ ← "random vector" (before data collection)

Observed: $\hat{\beta} = \begin{bmatrix} 0.589 \\ -0.053 \\ \vdots \\ -3.264 \end{bmatrix}$

Odds ratio comparing program C to program B:

$$\frac{\text{odds admit} \mid C}{\text{odds admit} \mid B} \xrightarrow{\text{estimate}} \frac{e^{\hat{\beta}_0 + \hat{\beta}_2}}{e^{\hat{\beta}_0 + \hat{\beta}_1}} = e^{\hat{\beta}_2 - \hat{\beta}_1}$$

$$\hat{\beta}_2 - \hat{\beta}_1 = \underset{1\times 6}{A}\,\hat{\beta} = \begin{bmatrix} 0 & -1 & 1 & 0 & 0 & 0 \end{bmatrix} \begin{pmatrix} \hat{\beta}_0 \\ \hat{\beta}_1 \\ \hat{\beta}_2 \\ \hat{\beta}_3 \\ \hat{\beta}_4 \\ \hat{\beta}_5 \end{pmatrix}$$

R: $\hat{\beta}$ ← coef(mod)

$\widehat{Var}(\hat{\beta})$ ← vcov(mod)

Model Comparison Tests Based on Deviance (Sec. 4.4.2 - 3.4.4)

- General GLM

H_0: Reduced model M_R

H_a: Full model M_F

M_R is nested within M_F -> Can obtain M_R by setting a subset of coefs. in M_F to zero.