2K1 in Silico | DGP: Ordered Logit (X) | > Model: Ordered Logit (X) | > Quantities of Interest

Press for Tutorial Mode

Generated Y (from DGP Tab)

3, 1, 3, 1, 1, 3, 1, 2, 1, 1, 1, 1, 3, 2, 2, 3, 2, 1, 1, 1, 2, 1, 3, 1, 2, 1, 3, 3, 3, 3, 1, 1, 3, 1, 3, 1, 3, 1, 3, 3, 3, 1, 1, 1, 1, 1, 1, 3, 2, 1, 1, 1, 1, 1, 1, 1, 2, 3, 1, 3, 3, 1, 3, 2, 2, 3, 1, 3, 3, 1, 1, 2, 1, 1, 2, 1, 1, 3, 1, 3, 2, 1, 3, 3, 1, 1, 1, 1, 1, 1, 1, 3, 1, 3, 1, 1, 1, 3, 3, 1, 2, 3, 2, 3, 2, 1, 3, 2, 1, 3, 1, 3, 2, 2, 3, 2, 3, 1, 1, 2, 3, 1, 1, 2, 2, 2, 2, 3, 1, 3, 2, 1, 2, 1, 3, 1, 1, 1, 2, 3, 2, 2, 1, 3, 2, 2, 2, 3, 2, 3, 3, 2, 1, 3, 1, 3, 1, 2, 2, 1, 1, 3, 2, 1, 3, 2, 1, 1, 1, 3, 3, 3, 1, 2, 1, 2, 3, 3, 1, 3, 2, 2, 3, 3, 2, 3, 3, 1, 1

Assumed Distribution

Ordered Logit (X)

X_1 Normal B

X_2 Uniform A

+ −

Guesstimate

β_0 -4 1 4

β_2 -4 1.25 4

β_1 -4 -1 4

γ -2.5 -0.5 2.5

Set to MLE

Statistical Model

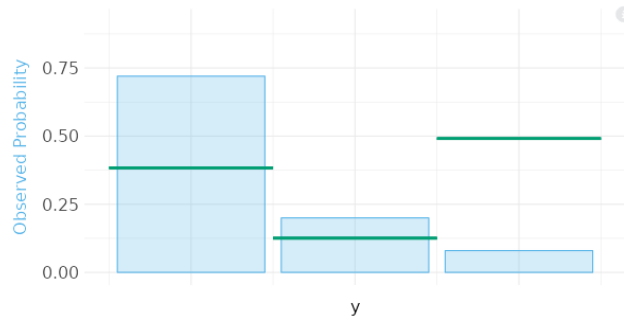
$$Y_i^* \sim \mathrm{STL}(\mu_i)$$

$$\mu_i = X_i\beta = \beta_0 + \beta_1 X_i$$

$$Y_i \perp\!\!\!\perp Y_j \quad \forall\, i \neq j$$

$$y_i = \begin{cases} 1 & \text{if} \quad y_i^* < \tau_0 \\ 2 & \text{if} \quad \tau_0 \leq y_i^* < \tau_1 \\ 3 & \text{if} \quad \tau_1 \leq y_i^* \end{cases}$$

$$\tau_1 = \exp(\gamma)$$

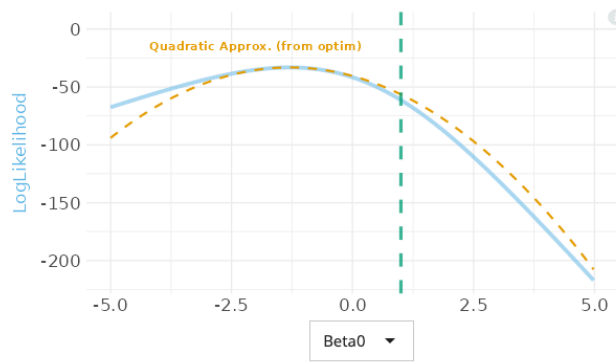


Log Likelihood

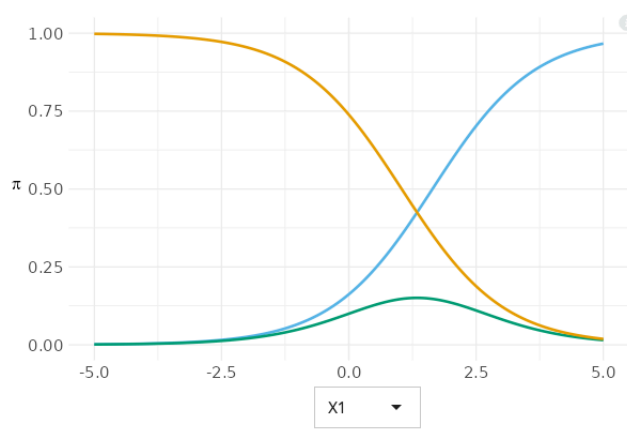
Likelihood for data $y = (y_1, \ldots, y_n)$:

$$L(\beta, \gamma | y, X) = k(y) \cdot \prod_{i=1}^{n} [\Pr(Y_i = j)]$$

$$\ln[L(\beta, \gamma | y, X)] \doteq \ln[F_{stl}(\exp(\gamma_j)|x_i\beta) - F_{stl}(\exp(\gamma_{j-1})|x_i\beta)]$$



Maximum Likelihood Estimates

$$\hat{\theta} = [\ \hat{\beta}_0,\ \hat{\beta}_1,\ \hat{\beta}_2,\ \hat{\gamma}\ ]$$
$$= [-1.29,\ -1.11,\ 2.56,\ 0.55\ ]$$

$$\hat{V}(\hat{\theta}) = \begin{bmatrix} 0.59 & 0.02 & -0.88 & 0.01 \\ 0.02 & 0.16 & -0.26 & -0.02 \\ -0.88 & -0.26 & 1.97 & 0.06 \\ 0.01 & -0.02 & 0.06 & 0.09 \end{bmatrix}$$