$$[\mu, \boldsymbol{\alpha}, \sigma, \sigma_\alpha \mid \mathbf{y}] \propto \prod_{i=1}^{N} \prod_{j=1}^{M} \left[y_{i,j} \mid g(\mu, \boldsymbol{\alpha}, \mathbf{x}), \sigma^2 \right] \times$$

$$\left[\alpha_j \mid 0, \sigma_\alpha \right] \left[\mu \right] \left[\sigma \right] \left[\sigma_\alpha \right]$$

$$g(\mu, \boldsymbol{\alpha}, \mathbf{x}) = \mu + \sum_{j=1}^{M} \alpha_j x_{i,j}$$