Appendix 1

1-full conditional distribution for σ_e^2:

$\sigma_e^2|\vartheta_{(-\sigma_e^2)}, y_{obs}, t \sim I\Gamma\left(\alpha_{\sigma_e^2}, \tau_{\sigma_e^2}\right)$,

where, $\alpha_{\sigma_e^2} = \frac{\sum_{i=1}^{n} n_i}{2} + \tau_e$ and $\tau_{\sigma_e^2} = \frac{1}{T_e} + \frac{1}{2}\sum_{i=1}^{m}(y_i - x_{1i}^{'}\beta_1 - z_{1i}^{'}b_{1i})'(y_i - x_{1i}^{'}\beta_1 - z_{1i}^{'}b_{1i})$

2-full conditional distribution for $\boldsymbol{\Psi}_k$, k=1,2:

$$\pi(\boldsymbol{\Psi}_k|\boldsymbol{\theta}_{(-\boldsymbol{\Psi}_k)}, \boldsymbol{y}, \boldsymbol{t}) \sim IW_{q_k}\left[\left(m + \tau_{b_k}, \mathbf{T}_{b_k}^{-1}\right) + \sum_{i=1}^{m} s_{b_{ik}}^2 \left(\boldsymbol{b}_{ik} - \boldsymbol{D}_{b_k}\boldsymbol{W}_{b_{ik}} + \boldsymbol{\mu}_{b_k}\right)\left(\boldsymbol{b}_{ik} - \boldsymbol{D}_{b_k}\boldsymbol{W}_{b_{ik}} + \boldsymbol{\mu}_{b_k}\right)^T\right]$$

3-full conditional distribution for $\mathbf{S}_{b_{ik}}^2$, k=1,2:

$$\pi(\mathrm{S}_{\mathrm{b_{ik}}}^2|\boldsymbol{\theta}_{\left(-\mathbf{s}_{b_{ik}}^2\right)}, \boldsymbol{y}, \boldsymbol{t}) \sim G(\alpha_{0k}, z_{0k})$$

$\alpha_{0k} = \frac{2q_k + \nu_{b_k}}{2}$ and $z_{0k} = \frac{\nu_{b_k} + \left(\nu_{b_k} + w_{b_k}^T w_{b_k}\right) + \left(\boldsymbol{b}_{ik} - \boldsymbol{D}_{b_k}\boldsymbol{W}_{b_{ik}} + \boldsymbol{\mu}_{b_k}\right)^T \boldsymbol{\Psi}_k^{-1}\left(\boldsymbol{b}_{ik} - \boldsymbol{D}_{b_k}\boldsymbol{W}_{b_{ik}} + \boldsymbol{\mu}_{b_k}\right)}{2}$