Require: Samples from the previous iteration $(\mathcal{T}_t, \mathcal{T}'_t, \mathcal{M}_t, \mathcal{M}'_t)$ for $t = 1, \ldots, T$ and $(\sigma^2, \boldsymbol{s}_{13})$, and data $(y_i, A_i, \boldsymbol{X}_i)$ for $i = 1, \cdots, N$

for $r = 1, \ldots, M$ iteration **do**

  for $i = 1, \ldots, N$ **do**

$$Z_i \sim \begin{cases} N\left(\sum_{t=1}^{T} g_1(\boldsymbol{X}_i; \mathcal{T}_t, \mathcal{M}_t), 1\right) I_{(Z_i > 0)} & \text{for } A_i = 1; \\ N\left(\sum_{t=1}^{T} g_1(\boldsymbol{X}_i; \mathcal{T}_t, \mathcal{M}_t), 1\right) I_{(Z_i \leq 0)} & \text{for } A_i = 0 \end{cases}$$ ▷ latent exposure variable

  end for

  for $j = 1, \ldots, T$ **do**

    for $i = 1, \ldots, N$ **do**

$R^{(r)}_{i,-j} = Z_i - \sum_{t \neq j} g_1(\boldsymbol{X}_i; \mathcal{T}_t, \mathcal{M}_t)$ ▷ residual of the exposure model

$H^{(r)}_{i,-j} = y_i - \sum_{t \neq j} g_3(\boldsymbol{X}_i; \mathcal{T}'_t, \mathcal{M}'_t)$ ▷ residual of the outcome model

    end for

$\mathcal{T}^{(r)}_j \sim [\mathcal{T}_j | R^{(r)}_{1,-j}, \cdots, R^{(r)}_{N,-j}, 1]$ ▷ based on one of the three acceptance ratios

$\mathcal{T}'^{,(r)}_j \sim [\mathcal{T}'_j | H^{(r)}_{1,-j}, \cdots, H^{(r)}_{N,-j}, \sigma^2]$ ▷ based on one of the three acceptance ratios

$\mathcal{M}^{(r)}_j \sim [\mathcal{M}_j | \mathcal{T}^{(r)}_j, R^{(r)}_{1,-j}, \cdots, R^{(r)}_{N,-j}, 1]$

$\mathcal{M}'^{,(r)}_j \sim [\mathcal{M}'_j | \mathcal{T}'^{,(r)}_j, H^{(r)}_{1,-j}, \cdots, H^{(r)}_{N,-j}, \sigma^2]$

  end for

$$(\sigma^2)^{(r)} \sim \text{Inv.Gamma}\left(a_\sigma + \frac{N}{2}, b_\sigma + \frac{1}{2}\left\{\sum_{i=1}^{N}\left(y_i - \sum_{t=1}^{T} g_3(\boldsymbol{X}_i; \mathcal{T}'^{,(r)}_t, \mathcal{M}'^{,(r)}_t)\right.\right.\right.$$

  Update $\boldsymbol{s}^{(r)}_{13}$ based on the M-H algorithm:

$$\text{Proposal:} \quad \boldsymbol{s}^{(r)}_{13} \sim \mathcal{D}\left(n_{0,3} + c + \alpha/P, n_{1,1} + n_{1,3} + \alpha/P, \cdots, n_{P,1} + n_{P,3} + \alpha/\right.$$

$$\text{Acceptance Ratio:} \quad P_{\text{AR}}(\boldsymbol{s}_{13} \to \boldsymbol{s}^{(r)}_{13}) = \min\left\{1, \left(\frac{1 - \sum_{j=1}^{P} s_j}{1 - \sum_{j=1}^{P} s^{(r)}_j}\right)^{\sum_{j=1}^{J} n_{j,3}}\right\}$$

end for