Appendix A. The R-MITS model

Let y_{it} denote the outcome of interest for unit i at time t,with $i \in \{1,..., N\}$, $t \in \{1,...,n_i\}$, and n_i denoting the time series length for unit i. Then the general regression is defined as

$$y_{it} = \mu_{it} + \varepsilon_{it}$$

where μ_{it} is the mean function and ε_{it} is the stochastic process that model fluctuations around the mean functions and auto-correlation within the time series. The mean function of outcome is

$$\mu_{it} = \begin{cases} \beta_{i0}^{\tau} + \beta_{i1}^{\tau} t, & t < \tau \\ (\beta_{i0}^{\tau} + \delta_i^{\tau}) + (\beta_{i1}^{\tau} + \Delta_i^{\tau}) t, & t \geq \tau \end{cases}$$

where β_{i0}^{τ} denotes the intercept of the mean function prior to the change-point, β_{i1}^{τ} denotes the slope of the outcome prior to the change-point, $\beta_{i0}^{\tau} + \delta_i^{\tau}$ is the intercept of the post-intervention phase, $\beta_{i1}^{\tau} + \Delta_i^{\tau}$ is the slope of the post-intervention phase for the outcome in unit i, and τ denotes the global over-all-unit change-point of the response. In the case with only one unit, τ denotes the change-point for that one-time series. If $\delta_i^{\tau} + \Delta_i^{\tau} = 0$, then there is no change in the mean function of unit i before and after τ. Further model details about the estimation procedure of R-MITS are described in Cruz et al (2021) [37].