1 Simulations

To shape the intuition for our identification results, this section presents a brief simulation based on the following data generating process (DGP):

$$T \sim Binom(0.5),\ D \sim Binom(0.5),\ U \sim Unif(-1,1),\ V \sim N(0,1)$$

independent of each other, and

$$M = I\{D + U + V > 0\}, \qquad Y_T = \Lambda((1 + D + M + D \cdot M) \cdot T + U).$$

Treatment D as well as the observed time period T are randomized, while the mediator-outcome association is confounded due to the unobserved time constant heterogeneity U. The potential outcome in period 1 is given by $Y_1(d, M(d')) = \Lambda((1 + d + M(d') + d \cdot M(d')) + U)$, where Λ denotes a link function. If the latter corresponds to the identity function, our model is linear and implies a homogeneous time trend T equal to 1. If Λ is nonlinear, the time trend is heterogeneous, which invalidates the common trend assumption of difference-in-differences models. M is not only a function of D and U, but also of the unobserved random term V, which guarantees common support w.r.t. U, see Assumptions 4 and 6. Compliers, always-takers, and never-takers satisfy, respectively: $c = I\{U + V \leq 0, 1 + U + V > 0\}$, $a = I\{U + V > 0\}$, and $n = I\{1 + U + V \leq 0\}$. In the simulations with 1,000 replications, we consider two sample sizes ($N = 1,000, 4,000$) and investigate the behaviour of our change-in-changes methods as well as the difference-in-differences approach of in both a linear (Λ equal to identity function) and nonlinear outcome model where Λ equals the exponential function. To implement the change-in-changes estimators in the simulations as well as the application in Section , we make use of the 'cic' command in the `qte` R-package by with its default values. Table reports the bias, standard deviation ('sd'), root mean squared error ('rmse'), true effect ('true'), and the relative root mean squared error in percent of the true effect ('relr')