1 Simulation

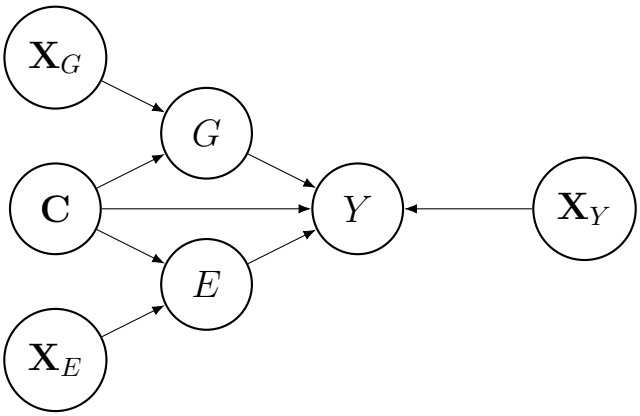

Figure 1: Directed Acyclic Graphs for causal interactions under two treatments G and E.

Let G and E denote the two binary treatments and Y be the binary outcome. Let $\mathbf{X}_G$, $\mathbf{X}_E$ be the set of instrumental variables for G and E, respectively. Let $\mathbf{X}_Y$ be the outcome-only covariates. Let $\mathbf{C}$ be the set of common confounders to both treatments.

1.1 Data generation

In this study, we will assume the outcome Y is binary and there are two treatments G and E. Let $\mathbf{X}_G = \{X_1, X_2\}$, $\mathbf{X}_E = \{X_3, X_4\}$, $\mathbf{X}_Y = \{X_5, X_6\}$ and $\mathbf{C} = \{X_7, X_8\}$. Suppose $\mathbf{X} = \{X_1, \ldots, X_8\}$ is generated to follow a multivariate normal distribution such that $\mathbf{X} \sim \mathcal{N}_8(\mathbf{0}, \mathbf{I}_8)$. To generate the treatment assignment probabilities, we firstly generate probabilities for each treatment individually:

$$\pi_{G=1} = P(G = 1 \mid \mathbf{Z}_G) = \frac{\exp\{f(\mathbf{Z}_G)\}}{1 + \exp\{f(\mathbf{Z}_G)\}}$$
$$\pi_{E=1} = P(E_i = 1 \mid \mathbf{Z}_E) = \frac{\exp\{f(\mathbf{Z}_E)\}}{1 + \exp\{f(\mathbf{Z}_E)\}}$$

where $f(\mathbf{Z}_G)$ and $f(\mathbf{Z}_E)$ are the function of $\mathbf{Z}_G$ and $\mathbf{Z}_E$ such that $\mathbf{Z}_G = \{X_1, X_2, X_7, X_8\}$ and $\mathbf{Z}_E = \{X_3, X_4, X_7, X_8\}$. We now suppose $f(\mathbf{Z}_G) = 0.8X_1 + 0.5X_2 - 0.3X_7 + 0.4X_8$ and $f(\mathbf{X}_E) = -0.5X_3 + 0.2X_4 + 0.3X_7 + 0.6X_8$. Note that here it is unnecessary to add the intercept as the expectation for each covariate is 0, making the marginal probabilities $\pi_{G=1}$ and $\pi_{E=1}$ are approximately 0.5. With the above setups, the probability of assignment for each combination of treatments can be computed as

$$\theta_{00} = p_{G=0,E=0} = (1 - \pi_{G=1})(1 - \pi_{E=1})$$
$$\theta_{10} = p_{G=1,E=0} = \pi_{G=1}(1 - \pi_{E=1})$$
$$\theta_{01} = p_{G=0,E=1} = (1 - \pi_{G=1})\pi_{E=1}$$
$$\theta_{11} = p_{G=1,E=1} = \pi_{G=1}\pi_{E=1}$$

Table 1: Summary of the simulated data

G	E	Y = 0	Y = 1	Rate
0	0	764	13	0.0167310
0	1	683	15	0.0214900
1	0	733	12	0.0161074
1	1	738	42	0.0538462

For each observation, the probability of receiving each pair of treatment follows a multinomial distribution such that $T_i \mid \mathbf{X} \sim \text{Multinomial}(1, \theta_{00}, \theta_{10}, \theta_{01}, \theta_{11})$. In addition, denote $\mathbf{Z}_Y = \{\mathbf{X}_Y, \mathbf{C}\} = \{X_5, X_6, X_7, X_8\}$, the outcome is generated as

$$\begin{aligned}\Pr(Y = 1 \mid \mathbf{Z}_Y, G, E) = \text{logit}^{-1}(&- 4.5 + 0.3X_5 - 0.5X_6 + 0.2X_7 + 0.4X_8 \\ &+ 0.3G + 0.4E + 0.8GE)\end{aligned}$$

The true value of RERI in terms of odds ratio can be computed as $\exp 0.3 + 0.4 + 0.8 - \exp 0.3 - \exp 0.4 + 1 = 2.64$

```
# Generate the data
sim_dat <- simulate_data_intercept(3000, -4.5, 2025)
mean(sim_dat$G == 1)
```

```
## [1] 0.5083333
```

```
mean(sim_dat$E == 1)
```

```
## [1] 0.4926667
```

Table 1 shows the summary of the simulated data. We can see that the rate of $Y = 1$ remains around 0.05.

In addition, from the simulated data, we can also estimate the RERI in terms of risk ratio. However, it is not the true value of $RERI_{OR}$ but approaches to the true value when the sample size increases. The estimate result is around 2.01.

```
# sim_dat_large <- simulate_data_intercept(1e6, -6, 2025)
# # truth on the risk scale
# p00 <- with(sim_dat_large, mean(Y[G==0 & E==0]))
# p10 <- with(sim_dat_large, mean(Y[G==1 & E==0]))
# p01 <- with(sim_dat_large, mean(Y[G==0 & E==1]))
# p11 <- with(sim_dat_large, mean(Y[G==1 & E==1]))
#
```

```r
# true_RERI_RR <- (p11 - p10 - p01 + p00) / p00
# true_RERI_RR
#
# # truth on the odds scale
# logit <- function(p) log(p/(1-p))
# OR11 <- exp(logit(p11) - logit(p00))
# OR10 <- exp(logit(p10) - logit(p00))
# OR01 <- exp(logit(p01) - logit(p00))
# true_RERI_OR <- OR11 - OR10 - OR01 + 1
# true_RERI_OR
```

```r
sim_dat <- simulate_data_intercept(3000, -3, 2025)
fit_outcome <- glm(
  Y ~ G * E + X5 + X6 + X7 + X8,
  data   = sim_dat,
  family = binomial(link = "logit")
)

summary(fit_outcome)
```

```
##
## Call:
## glm(formula = Y ~ G * E + X5 + X6 + X7 + X8, family = binomial(link = "logit"),
##     data = sim_dat)
##
## Coefficients:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept) -3.01687    0.16470 -18.317  < 2e-16 ***
## G            0.22595    0.21595   1.046  0.29541
## E            0.60443    0.21242   2.846  0.00443 **
## X5           0.33948    0.06492   5.229 1.70e-07 ***
## X6           0.46496    0.06590   7.056 1.72e-12 ***
## X7          -0.16173    0.06421  -2.519  0.01178 *
## X8          -0.06471    0.06702  -0.965  0.33434
## G:E          0.59422    0.27159   2.188  0.02867 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 1924.0  on 2999  degrees of freedom
## Residual deviance: 1770.3  on 2992  degrees of freedom
## AIC: 1786.3
##
```

```
## Number of Fisher Scoring iterations: 5
```

```
compute_RERI_OR(0.29833, 0.55582, 0.46435)
```

```
## [1] 1.646834
```

2 Testing different models (fitting one time)

2.1 Using control only

2.1.1 $\beta_0 = -6$

Model	β_0	β_1	β_2	β_3	Abs. Bias	Bias(%)
Default LOM	-5.040(0.449)	-0.584(0.348)	0.339(0.814)	1.251(0.899)	1.425	0.533
CLOM(X5X6)	-5.208(0.467)	-0.579(0.353)	0.419(0.865)	1.261(0.944)	1.379	0.522
CLOM(X7X8)	-5.069(0.462)	-0.595(0.342)	-0.034(0.602)	1.171(0.713)	1.469	0.556
CLOM(X5678)	-5.246(0.480)	-0.580(0.355)	0.044(0.652)	1.200(0.769)	1.440	0.545
MSLOM(X7X8)	-5.132(0.479)	-0.406(0.509)	0.293(0.821)	1.337(1.054)	1.339	0.500
MSLOM(X1278)	-4.998(0.513)	-0.591(0.359)	0.032(0.708)	1.372(0.889)	1.304	0.487
MSLOM(X3478)	-5.057(0.502)	-0.502(0.436)	0.098(0.723)	1.614(1.028)	1.062	0.397
MSLOM(X5678)	-5.171(0.475)	-0.423(0.493)	0.416(0.896)	1.385(1.129)	1.291	0.482
MSLOM(X123478)	-4.854(0.554)	-0.679(0.291)	-0.182(0.583)	1.634(0.881)	1.042	0.389
MSLOM(all)	-4.891(0.553)	-0.687(0.285)	-0.091(0.649)	1.627(0.919)	1.049	0.392
DR	-5.596(0.265)	-0.385(0.242)	0.425(0.459)	1.484(0.556)	1.156	0.438

Marginal: $RERI_{OR}^{true} = 2.676$, $RERI_{RR}^{true} = 2.633$; Conditional: $RERI_{OR}^{true} = 2.64$

2.1.2 $\beta_0 = -4.5$

Model	β_0	β_1	β_2	β_3	Abs. Bias	Bias(%)
Default LOM	-4.074(0.280)	-0.038(0.388)	0.291(0.494)	2.092(0.753)	0.316	0.131
CLOM(X5X6)	-4.254(0.289)	-0.026(0.395)	0.376(0.529)	2.202(0.806)	0.438	0.166
CLOM(X7X8)	-4.046(0.284)	-0.075(0.377)	0.260(0.491)	1.964(0.737)	0.676	0.256
CLOM(X5678)	-4.244(0.294)	-0.049(0.388)	0.380(0.539)	2.133(0.821)	0.507	0.192
MSLOM(X7X8)	-4.165(0.296)	0.244(0.524)	0.476(0.599)	2.041(0.928)	0.367	0.152
MSLOM(X1278)	-4.265(0.318)	1.185(1.051)	0.390(0.616)	1.344(1.156)	1.064	0.442
MSLOM(X3478)	-4.069(0.316)	-0.023(0.426)	0.230(0.517)	2.232(0.856)	0.176	0.073
MSLOM(X5678)	-4.195(0.295)	0.225(0.516)	0.622(0.664)	2.123(0.985)	0.285	0.118
MSLOM(X123478)	-4.133(0.347)	0.629(0.809)	0.122(0.514)	1.739(0.969)	0.669	0.278
MSLOM(all)	-4.166(0.344)	0.596(0.787)	0.264(0.589)	1.848(1.023)	0.560	0.233
DR	-4.404(0.157)	0.302(0.263)	0.646(0.323)	2.366(0.485)	0.274	0.104

Marginal: $RERI_{OR}^{true} = 2.408$, $RERI_{RR}^{true} = 2.254$; Conditional: $RERI_{OR}^{true} = 2.64$

2.1.3 $\beta_0 = -3.7$

Model	β_0	β_1	β_2	β_3	Abs. Bias	Bias(%)
Default LOM	-3.490(0.212)	0.138(0.334)	0.472(0.415)	2.084(0.612)	0.216	0.094
CLOM(X5X6)	-3.640(0.218)	0.148(0.339)	0.566(0.445)	2.216(0.658)	0.424	0.161
CLOM(X7X8)	-3.500(0.216)	0.113(0.330)	0.525(0.438)	2.079(0.639)	0.561	0.213
CLOM(X5678)	-3.671(0.223)	0.133(0.337)	0.663(0.481)	2.294(0.717)	0.346	0.131
MSLOM(X7X8)	-3.412(0.246)	0.108(0.362)	0.433(0.451)	1.919(0.634)	0.381	0.166
MSLOM(X1278)	-3.582(0.245)	0.905(0.672)	0.541(0.499)	1.471(0.810)	0.829	0.360
MSLOM(X3478)	-3.175(0.312)	-0.190(0.306)	0.005(0.371)	2.063(0.579)	0.237	0.103
MSLOM(X5678)	-3.441(0.245)	0.092(0.357)	0.593(0.502)	1.970(0.673)	0.330	0.143
MSLOM(X123478)	-3.357(0.292)	0.371(0.522)	0.101(0.395)	1.841(0.675)	0.459	0.200
MSLOM(all)	-3.382(0.291)	0.338(0.508)	0.233(0.447)	1.922(0.712)	0.378	0.164
DR	-3.608(0.110)	0.149(0.168)	0.576(0.219)	2.183(0.322)	0.457	0.173

Marginal: $RERI_{OR}^{true} = 2.300$, $RERI_{RR}^{true} = 1.998$; Conditional: $RERI_{OR}^{true} = 2.64$

2.1.4 $\beta_0 = -3$

Model	β_0	β_1	β_2	β_3	Abs. Bias	Bias(%)
Default LOM	-2.813(0.155)	0.250(0.264)	0.567(0.322)	1.764(0.452)	0.446	0.202
CLOM(X5X6)	-2.967(0.161)	0.262(0.270)	0.680(0.350)	1.930(0.497)	0.710	0.269
CLOM(X7X8)	-2.841(0.159)	0.231(0.263)	0.664(0.349)	1.815(0.484)	0.825	0.313
CLOM(X5678)	-3.017(0.165)	0.254(0.271)	0.830(0.389)	2.072(0.556)	0.568	0.215
MSLOM(X7X8)	-2.871(0.176)	0.318(0.305)	0.756(0.395)	1.825(0.540)	0.385	0.174
MSLOM(X1278)	-2.988(0.176)	0.705(0.432)	0.888(0.442)	1.665(0.659)	0.545	0.247
MSLOM(X3478)	-2.744(0.218)	0.089(0.290)	0.400(0.366)	2.101(0.527)	0.109	0.049
MSLOM(X5678)	-2.906(0.175)	0.315(0.304)	0.920(0.434)	1.983(0.588)	0.227	0.103
MSLOM(X123478)	-2.868(0.204)	0.375(0.371)	0.537(0.396)	2.054(0.620)	0.156	0.071
MSLOM(all)	-2.898(0.206)	0.362(0.368)	0.661(0.430)	2.228(0.668)	0.018	0.008
DR	-3.073(0.087)	0.369(0.153)	0.957(0.209)	2.188(0.285)	0.452	0.171

Marginal: $RERI_{OR}^{true} = 2.210$, $RERI_{RR}^{true} = 1.701$; Conditional: $RERI_{OR}^{true} = 2.64$

2.1.5 $\beta_0 = -2$

Model	β_0	β_1	β_2	β_3	Abs. Bias	Bias(%)
Default LOM	-1.867(0.105)	0.305(0.188)	0.682(0.237)	1.780(0.355)	0.317	0.151
CLOM(X5X6)	-1.984(0.109)	0.316(0.193)	0.817(0.262)	2.017(0.403)	0.623	0.236
CLOM(X7X8)	-1.901(0.108)	0.289(0.188)	0.805(0.260)	1.862(0.386)	0.778	0.295
CLOM(X5678)	-2.038(0.112)	0.311(0.195)	0.998(0.295)	2.195(0.455)	0.445	0.169
MSLOM(X7X8)	-1.868(0.118)	0.284(0.200)	0.768(0.272)	1.895(0.414)	0.202	0.096
MSLOM(X1278)	-1.934(0.125)	0.420(0.246)	0.873(0.317)	2.097(0.523)	0.000	0.000
MSLOM(X3478)	-1.848(0.130)	0.221(0.204)	0.637(0.271)	1.973(0.412)	0.124	0.059
MSLOM(X5678)	-1.902(0.119)	0.268(0.199)	0.948(0.303)	2.103(0.456)	0.006	0.003
MSLOM(X123478)	-1.925(0.130)	0.324(0.233)	0.763(0.305)	2.249(0.528)	0.152	0.072
MSLOM(all)	-1.952(0.132)	0.291(0.229)	0.906(0.332)	2.526(0.581)	0.429	0.205
DR	-2.026(0.059)	0.320(0.103)	0.962(0.146)	2.321(0.213)	0.319	0.121

Marginal: $RERI_{OR}^{true} = 2.097$, $RERI_{RR}^{true} = 1.168$; Conditional: $RERI_{OR}^{true} = 2.64$

2.1.6 $\beta_0 = -1$

Model	β_0	β_1	β_2	β_3	Abs. Bias	Bias(%)
Default LOM	-0.904(0.079)	0.371(0.151)	0.511(0.168)	2.336(0.366)	0.316	0.156
CLOM(X5X6)	-0.980(0.083)	0.392(0.159)	0.645(0.190)	2.773(0.437)	0.133	0.050
CLOM(X7X8)	-0.958(0.082)	0.403(0.157)	0.650(0.189)	2.607(0.422)	0.033	0.013
CLOM(X5678)	-1.054(0.086)	0.439(0.167)	0.845(0.219)	3.222(0.526)	0.582	0.220
MSLOM(X7X8)	-0.948(0.086)	0.419(0.166)	0.659(0.198)	2.287(0.428)	0.267	0.132
MSLOM(X1278)	-0.986(0.094)	0.689(0.231)	0.736(0.231)	1.916(0.505)	0.104	0.051
MSLOM(X3478)	-0.913(0.091)	0.347(0.165)	0.668(0.217)	2.244(0.437)	0.224	0.111
MSLOM(X5678)	-1.003(0.086)	0.463(0.172)	0.858(0.224)	2.652(0.495)	0.632	0.313
MSLOM(X123478)	-0.960(0.096)	0.611(0.228)	0.738(0.237)	2.017(0.518)	0.003	0.001
MSLOM(all)	-1.017(0.095)	0.662(0.235)	0.977(0.271)	2.338(0.591)	0.318	0.157
DR	-1.060(0.048)	0.472(0.093)	0.862(0.115)	2.932(0.212)	0.292	0.111

Marginal: $RERI_{OR}^{true} = 2.020$, $RERI_{RR}^{true} = 0.641$; Conditional: $RERI_{OR}^{true} = 2.64$

2.2 Using both control and case

2.2.1 $\beta_0 = -6$

Model	β_0	β_1	β_2	β_3	Abs. Bias	Bias(%)
Default LOM	-5.040(0.449)	-0.584(0.348)	0.339(0.814)	1.251(0.899)	1.425	0.533
CLOM(X5X6)	-5.208(0.467)	-0.579(0.353)	0.419(0.865)	1.261(0.944)	1.379	0.522
CLOM(X7X8)	-5.069(0.462)	-0.595(0.342)	-0.034(0.602)	1.171(0.713)	1.469	0.556
CLOM(X5678)	-5.246(0.480)	-0.580(0.355)	0.044(0.652)	1.200(0.769)	1.440	0.545
MSLOM(X7X8)	-5.131(0.479)	-0.406(0.510)	0.293(0.821)	1.327(1.050)	1.349	0.504
MSLOM(X1278)	-4.998(0.513)	-0.591(0.358)	0.031(0.707)	1.369(0.886)	1.307	0.488
MSLOM(X3478)	-5.057(0.502)	-0.501(0.437)	0.099(0.723)	1.605(1.025)	1.071	0.400
MSLOM(X5678)	-5.171(0.476)	-0.420(0.495)	0.411(0.892)	1.378(1.126)	1.298	0.485
MSLOM(X123478)	-4.858(0.553)	-0.678(0.291)	-0.182(0.583)	1.630(0.879)	1.046	0.391
MSLOM(all)	-4.895(0.552)	-0.685(0.286)	-0.093(0.647)	1.626(0.917)	1.050	0.392
DR	-5.598(0.265)	-0.382(0.242)	0.429(0.460)	1.480(0.557)	1.160	0.439

Marginal: $RERI_{OR}^{true} = 2.676$, $RERI_{RR}^{true} = 2.633$; Conditional: $RERI_{OR}^{true} = 2.64$

2.2.2 $\beta_0 = -4.5$

Model	β_0	β_1	β_2	β_3	Abs. Bias	Bias(%)
Default LOM	-4.074(0.280)	-0.038(0.388)	0.291(0.494)	2.092(0.753)	0.316	0.131
CLOM(X5X6)	-4.254(0.289)	-0.026(0.395)	0.376(0.529)	2.202(0.806)	0.438	0.166
CLOM(X7X8)	-4.046(0.284)	-0.075(0.377)	0.260(0.491)	1.964(0.737)	0.676	0.256
CLOM(X5678)	-4.244(0.294)	-0.049(0.388)	0.380(0.539)	2.133(0.821)	0.507	0.192
MSLOM(X7X8)	-4.167(0.296)	0.241(0.523)	0.477(0.598)	2.038(0.924)	0.370	0.154
MSLOM(X1278)	-4.268(0.319)	1.153(1.031)	0.388(0.613)	1.375(1.141)	1.033	0.429
MSLOM(X3478)	-4.070(0.317)	-0.026(0.425)	0.231(0.517)	2.223(0.851)	0.185	0.077
MSLOM(X5678)	-4.195(0.295)	0.219(0.513)	0.613(0.658)	2.109(0.973)	0.299	0.124
MSLOM(X123478)	-4.134(0.348)	0.604(0.795)	0.118(0.512)	1.752(0.958)	0.656	0.272
MSLOM(all)	-4.162(0.346)	0.557(0.767)	0.247(0.579)	1.849(1.000)	0.559	0.232
DR	-4.407(0.156)	0.300(0.262)	0.650(0.322)	2.365(0.488)	0.275	0.104

Marginal: $RERI_{OR}^{true} = 2.408$, $RERI_{RR}^{true} = 2.254$; Conditional: $RERI_{OR}^{true} = 2.64$

2.2.3 $\beta_0 = -3.7$

Model	β_0	β_1	β_2	β_3	Abs. Bias	Bias(%)
Default LOM	-3.490(0.212)	0.138(0.334)	0.472(0.415)	2.084(0.612)	0.216	0.094
CLOM(X5X6)	-3.640(0.218)	0.148(0.339)	0.566(0.445)	2.216(0.658)	0.424	0.161
CLOM(X7X8)	-3.500(0.216)	0.113(0.330)	0.525(0.438)	2.079(0.639)	0.561	0.213
CLOM(X5678)	-3.671(0.223)	0.133(0.337)	0.663(0.481)	2.294(0.717)	0.346	0.131
MSLOM(X7X8)	-3.415(0.247)	0.109(0.362)	0.430(0.449)	1.899(0.626)	0.401	0.174
MSLOM(X1278)	-3.593(0.246)	0.890(0.664)	0.544(0.499)	1.491(0.802)	0.809	0.352
MSLOM(X3478)	-3.188(0.311)	-0.180(0.309)	0.013(0.373)	2.035(0.569)	0.265	0.115
MSLOM(X5678)	-3.438(0.246)	0.091(0.356)	0.563(0.492)	1.930(0.655)	0.370	0.161
MSLOM(X123478)	-3.378(0.289)	0.377(0.519)	0.112(0.395)	1.833(0.668)	0.467	0.203
MSLOM(all)	-3.398(0.287)	0.339(0.502)	0.228(0.438)	1.884(0.692)	0.416	0.181
DR	-3.612(0.109)	0.151(0.167)	0.580(0.218)	2.173(0.326)	0.467	0.177

Marginal: $RERI_{OR}^{true} = 2.300$, $RERI_{RR}^{true} = 1.998$; Conditional: $RERI_{OR}^{true} = 2.64$

2.2.4 $\beta_0 = -3$

Model	β_0	β_1	β_2	β_3	Abs. Bias	Bias(%)
Default LOM	-2.813(0.155)	0.250(0.264)	0.567(0.322)	1.764(0.452)	0.446	0.202
CLOM(X5X6)	-2.967(0.161)	0.262(0.270)	0.680(0.350)	1.930(0.497)	0.710	0.269
CLOM(X7X8)	-2.841(0.159)	0.231(0.263)	0.664(0.349)	1.815(0.484)	0.825	0.313
CLOM(X5678)	-3.017(0.165)	0.254(0.271)	0.830(0.389)	2.072(0.556)	0.568	0.215
MSLOM(X7X8)	-2.878(0.177)	0.326(0.308)	0.766(0.399)	1.805(0.537)	0.405	0.183
MSLOM(X1278)	-3.005(0.177)	0.716(0.433)	0.912(0.449)	1.679(0.663)	0.531	0.240
MSLOM(X3478)	-2.752(0.222)	0.093(0.294)	0.414(0.374)	2.045(0.517)	0.165	0.075
MSLOM(X5678)	-2.900(0.176)	0.308(0.303)	0.887(0.426)	1.882(0.563)	0.328	0.148
MSLOM(X123478)	-2.886(0.206)	0.385(0.373)	0.562(0.404)	2.028(0.617)	0.182	0.082
MSLOM(all)	-2.907(0.205)	0.358(0.364)	0.662(0.428)	2.117(0.642)	0.093	0.042
DR	-3.079(0.085)	0.382(0.152)	0.975(0.208)	2.174(0.292)	0.466	0.177

Marginal: $RERI_{OR}^{true} = 2.210$, $RERI_{RR}^{true} = 1.701$; Conditional: $RERI_{OR}^{true} = 2.64$

2.2.5 $\beta_0 = -2$

Model	β_0	β_1	β_2	β_3	Abs. Bias	Bias(%)
Default LOM	-1.745(0.101)	0.410(0.196)	0.150(0.162)	1.959(0.328)	0.138	0.066
CLOM(X5X6)	-1.833(0.104)	0.426(0.202)	0.136(0.162)	2.198(0.361)	0.442	0.167
CLOM(X7X8)	-1.794(0.103)	0.390(0.195)	0.248(0.178)	2.148(0.368)	0.492	0.186
CLOM(X5678)	-1.883(0.106)	0.408(0.202)	0.236(0.179)	2.393(0.406)	0.247	0.094
MSLOM(X7X8)	-1.800(0.112)	0.418(0.212)	0.289(0.196)	2.255(0.398)	0.158	0.075
MSLOM(X1278)	-1.956(0.116)	0.757(0.286)	0.488(0.243)	2.118(0.476)	0.021	0.010
MSLOM(X3478)	-1.758(0.116)	0.375(0.215)	0.235(0.194)	2.114(0.389)	0.017	0.008
MSLOM(X5678)	-1.798(0.112)	0.429(0.214)	0.277(0.194)	2.248(0.398)	0.151	0.072
MSLOM(X123478)	-1.926(0.118)	0.729(0.298)	0.426(0.239)	1.987(0.473)	0.110	0.052
MSLOM(all)	-1.919(0.119)	0.737(0.299)	0.401(0.235)	1.966(0.469)	0.131	0.062
DR	-1.902(0.054)	0.414(0.101)	0.266(0.091)	2.614(0.211)	0.026	0.010

Marginal: $RERI_{OR}^{true} = 2.097$, $RERI_{RR}^{true} = 1.168$; Conditional: $RERI_{OR}^{true} = 2.64$

2.2.6 $\beta_0 = -1$

Model	β_0	β_1	β_2	β_3	Abs. Bias	Bias(%)
Default LOM	-0.973(0.083)	0.382(0.156)	0.243(0.143)	2.471(0.355)	0.451	0.223
CLOM(X5X6)	-1.049(0.086)	0.477(0.172)	0.230(0.146)	2.910(0.422)	0.270	0.102
CLOM(X7X8)	-1.010(0.085)	0.351(0.155)	0.339(0.157)	2.714(0.401)	0.074	0.028
CLOM(X5678)	-1.088(0.089)	0.428(0.170)	0.336(0.162)	3.225(0.482)	0.585	0.222
MSLOM(X7X8)	-0.966(0.092)	0.320(0.160)	0.243(0.154)	2.573(0.403)	0.553	0.274
MSLOM(X1278)	-0.923(0.107)	0.199(0.167)	0.224(0.183)	2.544(0.458)	0.524	0.259
MSLOM(X3478)	-0.996(0.095)	0.334(0.169)	0.321(0.168)	2.657(0.430)	0.637	0.315
MSLOM(X5678)	-0.972(0.092)	0.356(0.165)	0.214(0.150)	2.606(0.407)	0.586	0.290
MSLOM(X123478)	-0.952(0.110)	0.202(0.174)	0.305(0.203)	2.592(0.479)	0.572	0.283
MSLOM(all)	-0.953(0.110)	0.235(0.179)	0.251(0.192)	2.617(0.477)	0.597	0.296
DR	-1.052(0.043)	0.402(0.083)	0.244(0.073)	3.051(0.218)	0.411	0.156

Marginal: $RERI_{OR}^{true} = 2.020$, $RERI_{RR}^{true} = 0.641$; Conditional: $RERI_{OR}^{true} = 2.64$