data generating model:

$$Y = Cb + E\alpha + G\beta + W\eta + \varepsilon$$

C: clinical factor
$C = (C_1, \dots, C_{q1})$, $b = (b_1, \dots, b_{q1})^T$, q1=10, b is generated from unif (1, 2.2)

E: environmental factor
$E = (E_1, \dots, E_{q2})$, $\alpha = (\alpha_1, \dots, \alpha_{q2})^T$, q1=4, α is generated from unif (1.2, 2.5)

G: genes
$G = (G_1, \dots, G_P)$, $\beta = (\beta_1, \dots, \beta_P)^T$, P=100, the nonzero $(\beta_1, \dots, \beta_5)$ is generated from unif(1, 2.5) and other β is 0.
#nonzero: 5

W: GxE interactions
$W = (G_1 \times E_1, \dots, G_1 \times E_{q2}, \dots, G_p \times E_1, \dots, G_p \times E_{q2},)$, $\eta = (\eta_1, \dots, \eta_{PXq2})^T$
the nonzero $(\eta_1, \dots, \eta_3), \eta_8, (\eta_9, \dots, \eta_{11}), \eta_{16}, (\eta_{17}, \dots, \eta_{19}), \eta_{24}$ are generated from unif(1, 2.5) and other η is 0.
#nonzero: 12

Estimate the coefficients of β and η with marginal model:

$$Y = Cb + E\alpha + X\beta + W'\eta' + \varepsilon$$

$X = G_j$, $W' = (X \times E_1, \dots, X \times E_{q2})$, $\eta' = (\eta'_1, \dots, \eta'_{q2})^T$

Simulation Results

Bayesian Lasso (n=100, p=100)

	TP(main)	FP(main)	TP(interaction)	FP(interaction)
mean	1.233333	0	2.233333	2.433333
sd	0.8583598	0	1.304722	2.473073

Bayesian Lasso Spike and Slab (n=200, p=100)

	TP(main)	FP(main)	TP(interaction)	FP(interaction)
mean	3.133333	0	3.933333	0.3666667
sd	1.195778	0	1.362891	0.8502873

LAD Bayesian Lasso (n=100, p=50)

	TP(main)	FP(main)	TP(interaction)	FP(interaction)
mean	3.566667	0.9	5.3	2.066667
sd	0.9352607	0.9948141	1.784029	1.311312

LAD Bayesian Lasso spike and slab (n=100, p=50)

	TP(main)	FP(main)	TP(interaction)	FP(interaction)
mean	1.166667	0	2.366667	0.3333333
sd	0.9498941	0	1.564329	0.5466723

n=100, p=100

Bayesian Lasso (n=100, p=100)

	TP(main)	FP(main)	TP(interaction)	FP(interaction)
mean	1.233333	0	2.233333	2.433333
sd	0.8583598	0	1.304722	2.473073

Bayesian Lasso Spike and Slab

	TP(main)	FP(main)	TP(interaction)	FP(interaction)
mean	3.133333	0	3.933333	0.3666667
sd	1.195778	0	1.362891	0.8502873

LAD Bayesian Lasso (n=100, p=100)

	TP(main)	FP(main)	TP(interaction)	FP(interaction)
mean	3.466667	1.233333	5.1	3.9
sd	1.041661	1.135124	1.66816	2.264417

LAD Bayesian Lasso spike and slab (n=100, p=100)

	TP(main)	FP(main)	TP(interaction)	FP(interaction)
mean	1.266667	0.03333333	2.133333	0.3333333
sd	1.048261	0.1825742	1.407696	0.5466723

n=100, p=200

Bayesian Lasso

	TP(main)	FP(main)	TP(interaction)	FP(interaction)
mean	1.233333	0	2.433333	3.433333
sd	1.040004	0	1.50134	4.048698

Bayesian Lasso Spike and Slab

	TP(main)	FP(main)	TP(interaction)	FP(interaction)
mean	2.866667	0	4.333333	0.5
sd	1.136642	0	1.49328	0.7310833

LAD Bayesian Lasso

	TP(main)	FP(main)	TP(interaction)	FP(interaction)
mean				
sd				

LAD Bayesian Lasso spike and slab

	TP(main)	FP(main)	TP(interaction)	FP(interaction)
mean				
sd				