1 Description of DGP

$$
\begin{aligned}
W_1 &\sim Normal(\mu = 0, \sigma^2 = 1) \\
W_2, W_3, W_4 &\sim \mathcal{N}(\boldsymbol{\mu} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}, \boldsymbol{\Sigma} = \begin{bmatrix} 1.0 & 0.3 & 0.7 \\ 0.3 & 1.0 & 0.8 \\ 0.7 & 0.8 & 1.0 \end{bmatrix}) \\
A &\sim Bernoulli(p = 0.5) \\
Y &\sim Bernoulli(p) \ .
\end{aligned}
$$

$p = logit^{-1}(0.5 * plogis(1 - W1^2 + 3 * W2 + 5 * W3^2 * A - 4.45 * A) + 0.5 * plogis(-0.5 - W3 + 2 * W1 * W2 + 3 *$

True blip function is:

$$
\begin{aligned}
B_0(W) =& 0.5[logit^{-1}(1 - W_1^2 + 3W_2 + 5W_3^2 - 4.45) + logit^{-1}(-0.5 - W_3 + 2W_1W_2 + 3|W2| - 1.5) \\
& - logit^{-1}(1 - W_1^2 + 3W_2) + logit^{-1}(-0.5 - W_3 + 2W_1W_2)] \ .
\end{aligned}
$$

2 Library legend

- Simple - GLMs
  - QAW.SL.library = linear model with W_j and A as main terms and W_j*A interaction for each j
  - blip.SL.library = linear model with main terms W_j for each j
- Medium - ML + GLMs not aggressive
  - QAW.SL.library = GLMs library AND SL.glm, SL.mean, SL.glm.interaction, SL.earth, SL.nnet, SL.svm, SL.rpart
  - blip.SL.library = GLMs library AND SL.glm, SL.mean, SL.glm.interaction, SL.earth, SL.nnet, SL.svm, SL.rpart
- Aggressive - ML + GLMs not aggressive
  - QAW.SL.library = ML + GLMs aggressive library AND SL.randomForest
  - blip.SL.library = ML + GLMs aggressive library AND SL.randomForest

2.1 Table EnYd0 for E0Yd0

```
##                                Library Estimator    Bias Variance    MSE
## Psi_gcomp                         GLMs   G-comp. -0.0917   0.0002 0.0086
## Psi_IPTW                          GLMs      IPTW  0.0032   0.0007 0.0007
## Psi_IPTW_DR                       GLMs   IPTW-DR  0.0029   0.0004 0.0004
## Psi_TMLE                          GLMs      TMLE  0.0030   0.0004 0.0004
## Psi_CV.TMLE                       GLMs   CV-TMLE  0.0031   0.0004 0.0004
## Psi_gcomp1   ML + GLMs not aggressive   G-comp. -0.0954   0.0012 0.0103
## Psi_IPTW1    ML + GLMs not aggressive      IPTW  0.0037   0.0008 0.0008
## Psi_IPTW_DR1 ML + GLMs not aggressive   IPTW-DR  0.0035   0.0005 0.0005
## Psi_TMLE1    ML + GLMs not aggressive      TMLE  0.0034   0.0005 0.0005
```

```
## Psi_CV.TMLE1 ML + GLMs not aggressive   CV-TMLE  0.0037   0.0005 0.0005
## Psi_gcomp2       ML + GLMs aggressive   G-comp. -0.0875   0.0008 0.0085
## Psi_IPTW2        ML + GLMs aggressive      IPTW  0.0031   0.0008 0.0008
## Psi_IPTW_DR2     ML + GLMs aggressive   IPTW-DR -0.0041   0.0005 0.0005
## Psi_TMLE2        ML + GLMs aggressive      TMLE -0.0033   0.0005 0.0005
## Psi_CV.TMLE2     ML + GLMs aggressive   CV-TMLE  0.0034   0.0005 0.0005
##              Coverage
## Psi_gcomp           -
## Psi_IPTW        95.4%
## Psi_IPTW_DR     97.1%
## Psi_TMLE        96.8%
## Psi_CV.TMLE     96.2%
## Psi_gcomp1          -
## Psi_IPTW1       94.8%
## Psi_IPTW_DR1    95.2%
## Psi_TMLE1       95.9%
## Psi_CV.TMLE1    95.2%
## Psi_gcomp2          -
## Psi_IPTW2       94.3%
## Psi_IPTW_DR2    92.7%
## Psi_TMLE2       92.9%
## Psi_CV.TMLE2    94.2%
```

2.2 Table EnYdn for E0Yd0

```
##                              Library Estimator    Bias Variance    MSE
## Psi_gcomp                       GLMs   G-comp. -0.0720   0.0004 0.0055
## Psi_IPTW                        GLMs      IPTW -0.0527   0.0009 0.0036
## Psi_IPTW_DR                     GLMs   IPTW-DR -0.0531   0.0007 0.0035
## Psi_TMLE                        GLMs      TMLE -0.0531   0.0007 0.0035
## Psi_CV.TMLE                     GLMs   CV-TMLE -0.0705   0.0010 0.0059
## Psi_gcomp1   ML + GLMs not aggressive   G-comp. -0.0953   0.0013 0.0104
## Psi_IPTW1    ML + GLMs not aggressive      IPTW  0.0227   0.0009 0.0014
## Psi_IPTW_DR1 ML + GLMs not aggressive   IPTW-DR  0.0263   0.0007 0.0013
## Psi_TMLE1    ML + GLMs not aggressive      TMLE  0.0259   0.0006 0.0013
## Psi_CV.TMLE1 ML + GLMs not aggressive   CV-TMLE -0.0233   0.0007 0.0012
## Psi_gcomp2       ML + GLMs aggressive   G-comp. -0.0848   0.0010 0.0082
## Psi_IPTW2        ML + GLMs aggressive      IPTW  0.1000   0.0095 0.0195
## Psi_IPTW_DR2     ML + GLMs aggressive   IPTW-DR  0.0860   0.0080 0.0154
## Psi_TMLE2        ML + GLMs aggressive      TMLE  0.0938   0.0106 0.0194
## Psi_CV.TMLE2     ML + GLMs aggressive   CV-TMLE -0.0221   0.0006 0.0011
##              Coverage
## Psi_gcomp           -
## Psi_IPTW        49.1%
## Psi_IPTW_DR     35.2%
## Psi_TMLE        35.2%
## Psi_CV.TMLE     19.3%
## Psi_gcomp1          -
## Psi_IPTW1       86.7%
```

```
## Psi_IPTW_DR1    74.3%
## Psi_TMLE1       74.3%
## Psi_CV.TMLE1    77.2%
## Psi_gcomp2         -
## Psi_IPTW2         43%
## Psi_IPTW_DR2    38.9%
## Psi_TMLE2       37.8%
## Psi_CV.TMLE2    78.7%
```

2.3 Table EnYdn for E0Ydn

```
##                                Library Estimator    Bias Variance    MSE
## Psi_gcomp                         GLMs   G-comp. -0.0029   0.0004 0.0004
## Psi_IPTW                          GLMs      IPTW  0.0164   0.0009 0.0011
## Psi_IPTW_DR                       GLMs   IPTW-DR  0.0160   0.0007 0.0010
## Psi_TMLE                          GLMs      TMLE  0.0160   0.0007 0.0010
## Psi_CV.TMLE                       GLMs   CV-TMLE  0.0009   0.0010 0.0010
## Psi_gcomp1   ML + GLMs not aggressive   G-comp. -0.0745   0.0013 0.0069
## Psi_IPTW1    ML + GLMs not aggressive      IPTW  0.0435   0.0009 0.0028
## Psi_IPTW_DR1 ML + GLMs not aggressive   IPTW-DR  0.0472   0.0007 0.0029
## Psi_TMLE1    ML + GLMs not aggressive      TMLE  0.0467   0.0006 0.0028
## Psi_CV.TMLE1 ML + GLMs not aggressive   CV-TMLE -0.0002   0.0007 0.0007
## Psi_gcomp2       ML + GLMs aggressive   G-comp. -0.0602   0.0010 0.0046
## Psi_IPTW2        ML + GLMs aggressive      IPTW  0.1246   0.0095 0.0251
## Psi_IPTW_DR2     ML + GLMs aggressive   IPTW-DR  0.1106   0.0080 0.0202
## Psi_TMLE2        ML + GLMs aggressive      TMLE  0.1184   0.0106 0.0246
## Psi_CV.TMLE2     ML + GLMs aggressive   CV-TMLE  0.0008   0.0006 0.0006
##              Coverage
## Psi_gcomp           -
## Psi_IPTW        96.1%
## Psi_IPTW_DR     91.2%
## Psi_TMLE          91%
## Psi_CV.TMLE     92.7%
## Psi_gcomp1          -
## Psi_IPTW1       69.3%
## Psi_IPTW_DR1    45.3%
## Psi_TMLE1       43.8%
## Psi_CV.TMLE1    94.5%
## Psi_gcomp2          -
## Psi_IPTW2       29.6%
## Psi_IPTW_DR2    25.6%
## Psi_TMLE2       24.7%
## Psi_CV.TMLE2    94.1%
```

3 Results

```
## pdf
##   2
```