Results simulation study DelayedGSD

April 16, 2024

1 Rejection rate

1.1 2 stages

Power by method (columns) and scenario (rows): (nominal level 80%)

scenario	n.sim	missing	binding	fixC	ar	method 1	method 2	method 3
1	10000	TRUE	TRUE	FALSE	10	90.43%	90.37%	90.18%
3	10000	TRUE	TRUE	FALSE	5	90.13%	90.11%	89.78%
5	10000	TRUE	TRUE	TRUE	10	90.00%	90.10%	90.18%
7	10000	TRUE	TRUE	TRUE	5	89.73%	89.79%	89.78%
9	9900	TRUE	FALSE	TRUE	10	90.20%	90.33%	90.41%
11	9900	TRUE	FALSE	TRUE	5	90.31%	90.47%	90.46%
13	9900	TRUE	FALSE	FALSE	10	90.74%	90.67%	90.41%
15	9900	TRUE	FALSE	FALSE	5	90.67%	90.66%	90.46%
17	10000	FALSE	TRUE	FALSE	5	90.38%	90.38%	90.09%

Type 1 error by method (columns) and scenario (rows): (nominal level 2.5%)

scenario	n.sim	missing	binding	fixC	ar	method 1	method 2	method 3
2	10000	TRUE	TRUE	FALSE	10	2.76%	2.75%	2.68%
4	10000	TRUE	TRUE	FALSE	5	2.72%	2.72%	2.70%
6	10000	TRUE	TRUE	TRUE	10	2.56%	2.56%	2.68%
8	10000	TRUE	TRUE	TRUE	5	2.62%	2.62%	2.70%
10	10000	TRUE	FALSE	TRUE	10	2.14%	2.15%	2.33%
12	10000	TRUE	FALSE	TRUE	5	2.29%	2.30%	2.34%
14	10000	TRUE	FALSE	FALSE	10	2.29%	2.27%	2.33%
16	10000	TRUE	FALSE	FALSE	5	2.36%	2.36%	2.34%
18	9900	FALSE	TRUE	FALSE	5	2.70%	2.70%	2.66%

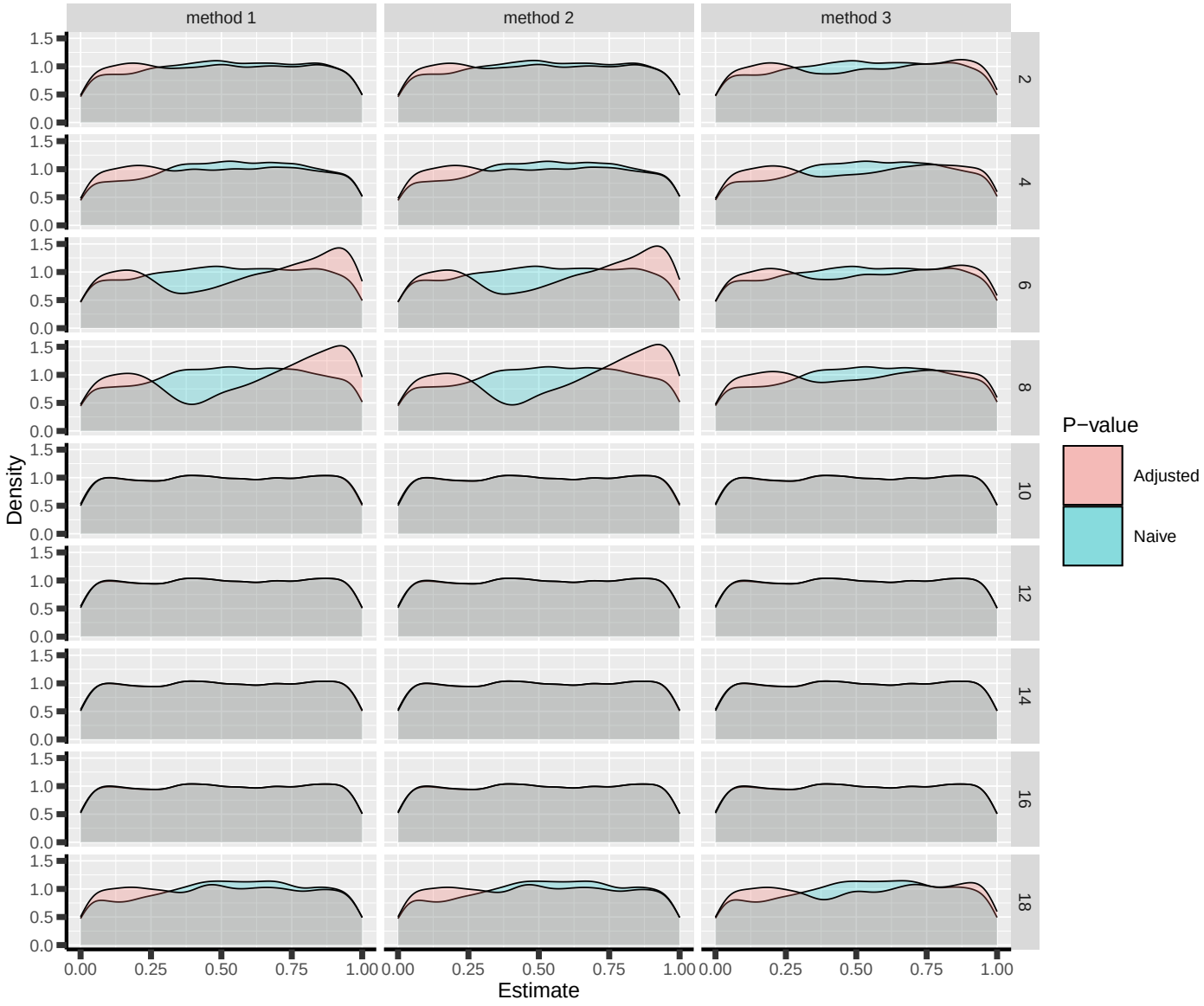

Figure 1: Naive and adjusted p-value distribution over all simulations under the null. Each row correspond to a different scenario

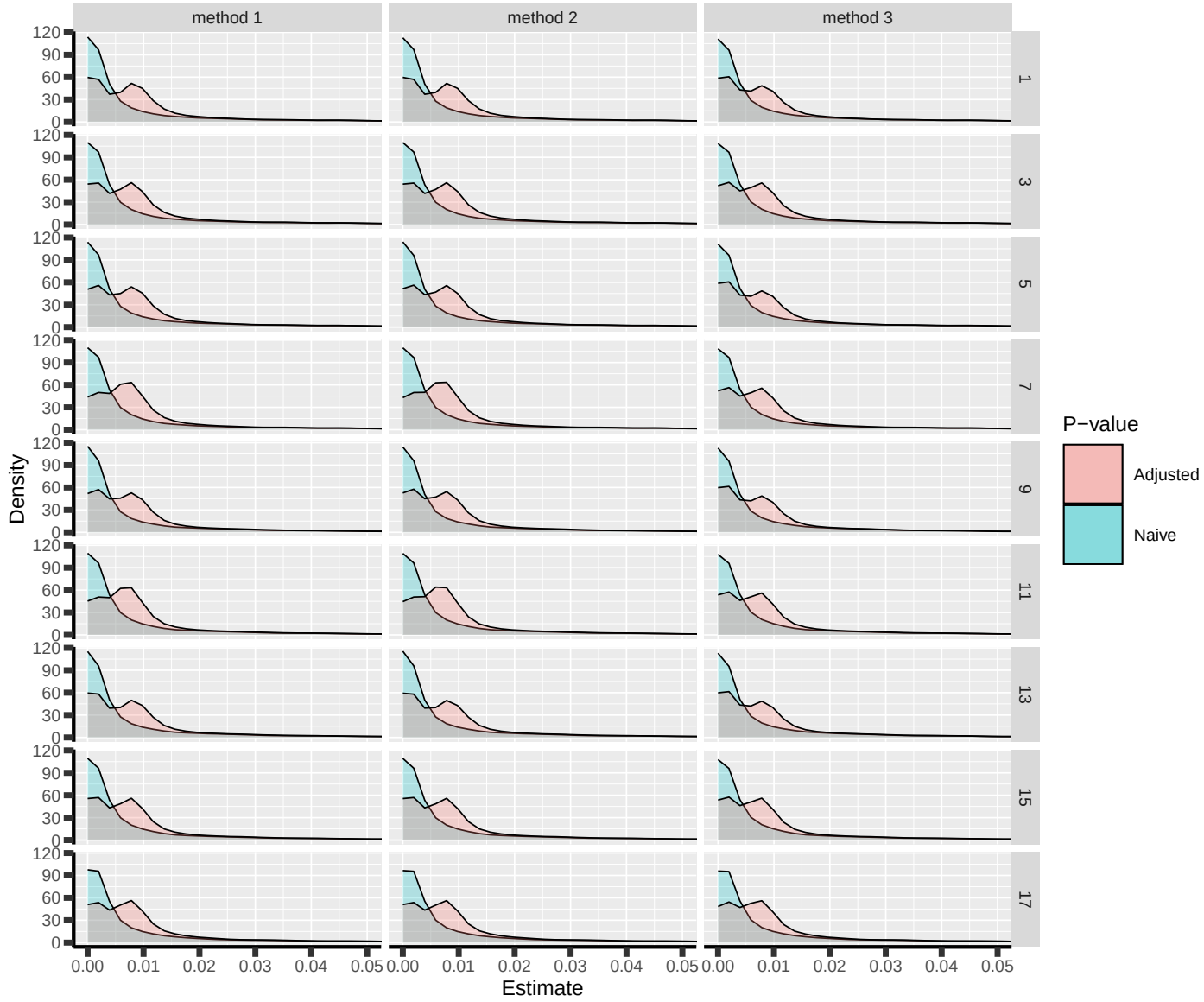

Figure 2: Naive and adjusted p-value distribution over all simulations under the alternative. Each row correspond to a different scenario

1.2 3 stages

Power by method (columns) and scenario (rows): (nominal level 80%)

scenario	n.sim	missing	binding	fixC	ar	method 1	method 2	method 3
1	10000	TRUE	TRUE	FALSE	10	90.96%	90.85%	90.44%
3	10000	TRUE	TRUE	FALSE	5	90.62%	90.61%	90.28%
5	10000	TRUE	TRUE	TRUE	10	90.30%	90.44%	90.44%
7	10000	TRUE	TRUE	TRUE	5	90.21%	90.34%	90.28%
9	10000	TRUE	FALSE	TRUE	10	90.01%	90.27%	90.40%
11	10000	TRUE	FALSE	TRUE	5	89.94%	90.12%	90.04%
13	10000	TRUE	FALSE	FALSE	10	90.60%	90.49%	90.40%
15	10000	TRUE	FALSE	FALSE	5	90.31%	90.31%	90.04%
17	10000	FALSE	TRUE	FALSE	5	89.85%	89.81%	89.57%

Type 1 error by method (columns) and scenario (rows): (nominal level 2.5%)

scenario	n.sim	missing	binding	fixC	ar	method 1	method 2	method 3
2	10000	TRUE	TRUE	FALSE	10	2.46%	2.51%	2.44%
4	10000	TRUE	TRUE	FALSE	5	2.52%	2.52%	2.49%
6	10000	TRUE	TRUE	TRUE	10	2.25%	2.24%	2.44%
8	10000	TRUE	TRUE	TRUE	5	2.41%	2.43%	2.49%
10	9931	TRUE	FALSE	TRUE	10	2.30%	2.32%	2.47%
12	10000	TRUE	FALSE	TRUE	5	2.50%	2.51%	2.64%
14	9931	TRUE	FALSE	FALSE	10	2.45%	2.42%	2.47%
16	10000	TRUE	FALSE	FALSE	5	2.52%	2.52%	2.64%
18	10000	FALSE	TRUE	FALSE	5	2.65%	2.65%	2.52%

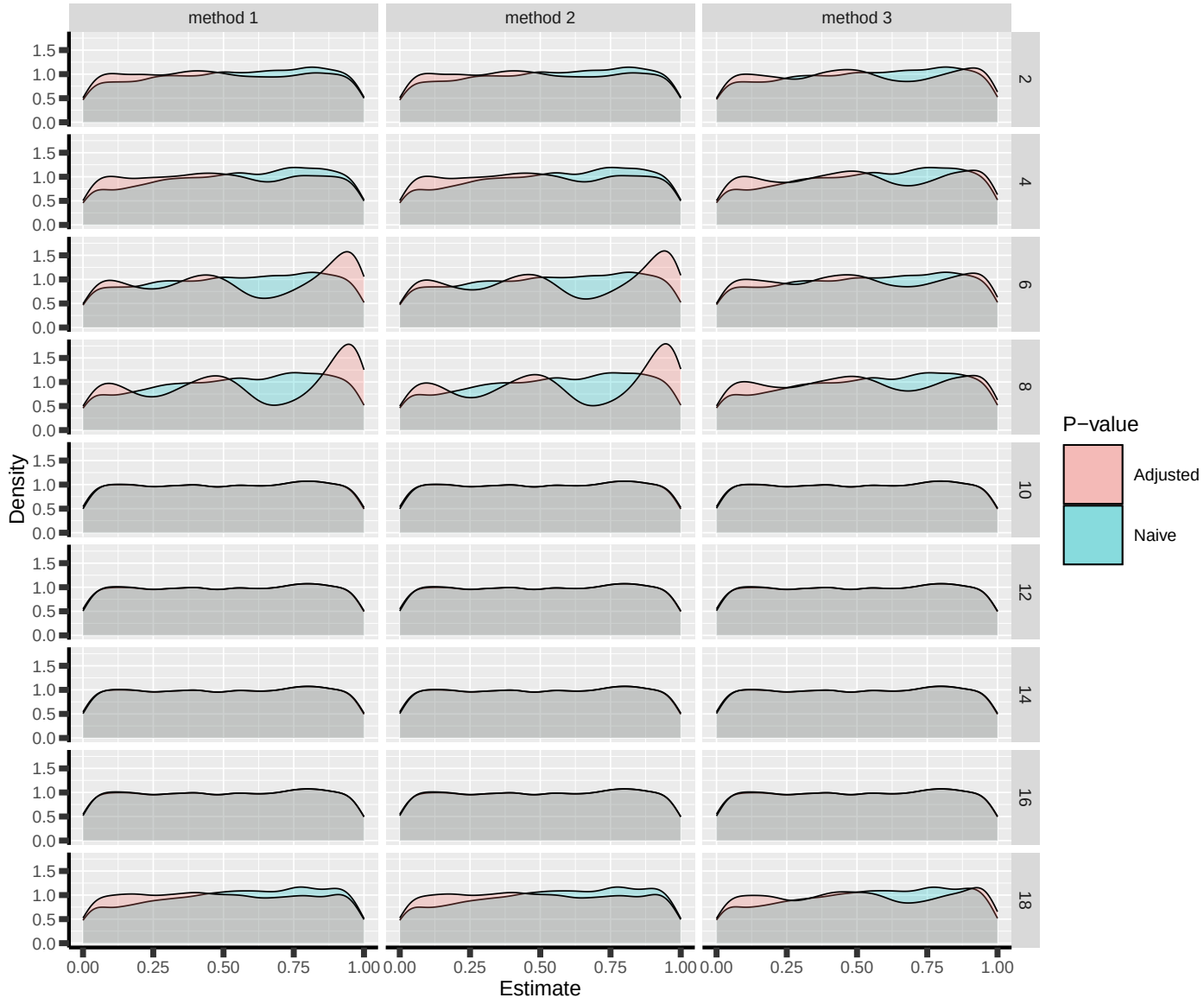

Figure 3: Naive and adjusted p-value distribution over all simulations under the null. Each row correspond to a different scenario

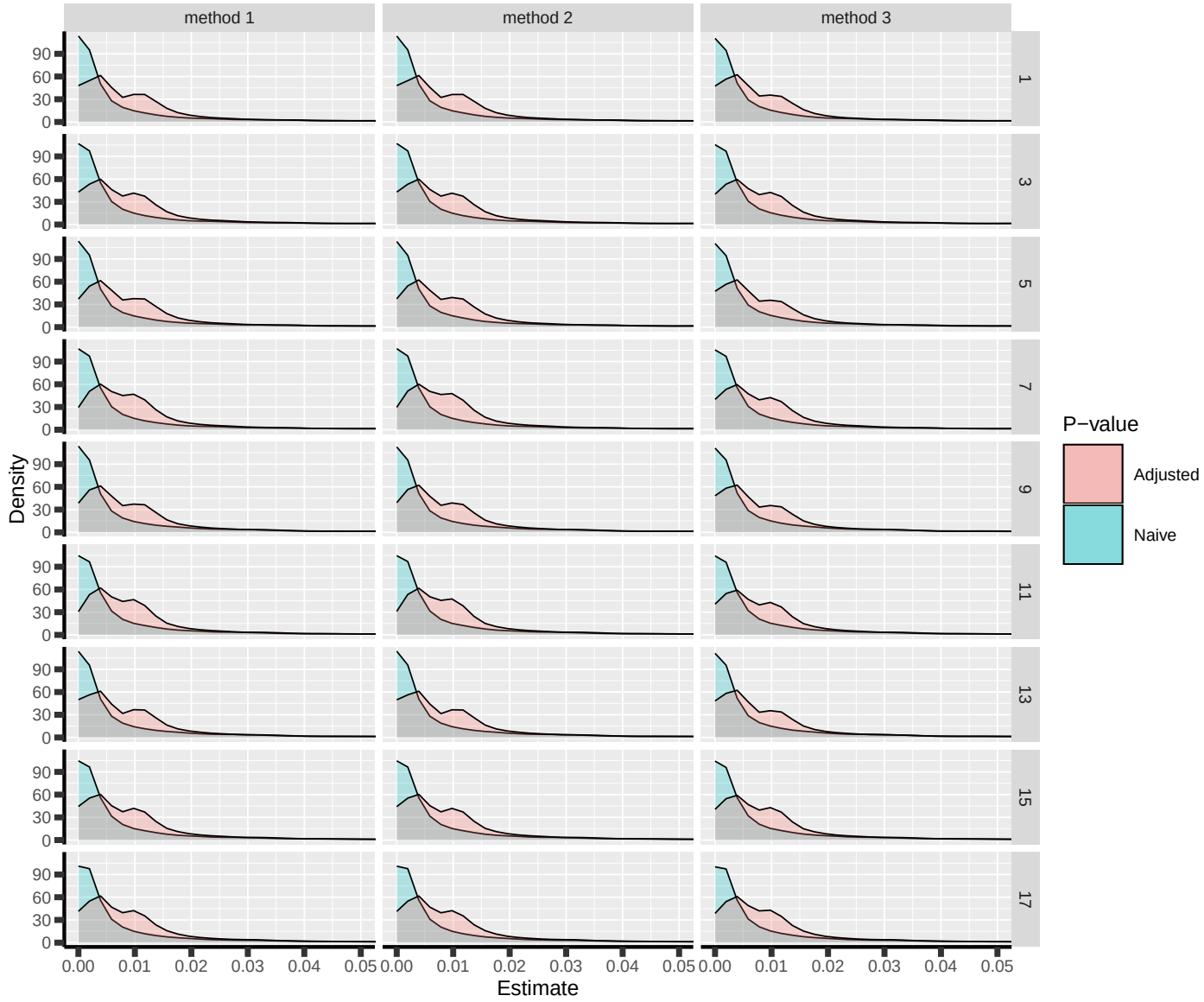

Figure 4: Naive and adjusted p-value distribution over all simulations under the alternative. Each row correspond to a different scenario

2 Conclusion of the trial

2.1 2 stages

Relative frequency of stopping for efficacy/futility at decision/final

- Method 1

	N	missing	hypo	binding	fixC	ar	decision.eff	decision.fut	final.eff	final.fut
1:	10000	TRUE	power	TRUE	FALSE	10	51.23%	2.90%	39.20%	6.67%
2:	10000	TRUE	typeI	TRUE	FALSE	10	0.86%	71.79%	1.90%	25.45%
3:	10000	TRUE	power	TRUE	FALSE	5	48.74%	2.99%	41.39%	6.88%
4:	10000	TRUE	typeI	TRUE	FALSE	5	0.81%	69.49%	1.91%	27.79%
5:	10000	TRUE	power	TRUE	TRUE	10	50.80%	3.33%	39.20%	6.67%
6:	10000	TRUE	typeI	TRUE	TRUE	10	0.66%	71.99%	1.90%	25.45%
7:	10000	TRUE	power	TRUE	TRUE	5	48.34%	3.39%	41.39%	6.88%
8:	10000	TRUE	typeI	TRUE	TRUE	5	0.71%	69.59%	1.91%	27.79%
9:	9900	TRUE	power	FALSE	TRUE	10	50.62%	3.70%	39.59%	6.10%
10:	10000	TRUE	typeI	FALSE	TRUE	10	0.45%	0.23%	1.69%	97.63%
11:	9900	TRUE	power	FALSE	TRUE	5	48.34%	3.47%	41.97%	6.21%
12:	10000	TRUE	typeI	FALSE	TRUE	5	0.55%	0.09%	1.74%	97.62%
13:	9900	TRUE	power	FALSE	FALSE	10	51.15%	3.16%	39.59%	6.10%
14:	10000	TRUE	typeI	FALSE	FALSE	10	0.60%	0.08%	1.69%	97.63%
15:	9900	TRUE	power	FALSE	FALSE	5	48.70%	3.12%	41.97%	6.21%
16:	10000	TRUE	typeI	FALSE	FALSE	5	0.62%	0.02%	1.74%	97.62%
17:	10000	FALSE	power	TRUE	FALSE	5	47.04%	2.46%	43.34%	7.16%
18:	9900	FALSE	typeI	TRUE	FALSE	5	0.82%	67.88%	1.88%	29.42%

Method 2:

	N	missing	hypo	binding	fixC	ar	decision.eff	decision.fut	final.eff	final.fut
1:	10000	TRUE	power	TRUE	FALSE	10	51.29%	3.13%	39.08%	6.50%
2:	10000	TRUE	typeI	TRUE	FALSE	10	0.86%	72.69%	1.89%	24.56%
3:	10000	TRUE	power	TRUE	FALSE	5	48.74%	3.01%	41.37%	6.88%
4:	10000	TRUE	typeI	TRUE	FALSE	5	0.82%	69.59%	1.90%	27.69%
5:	10000	TRUE	power	TRUE	TRUE	10	50.50%	2.92%	39.60%	6.98%
6:	10000	TRUE	typeI	TRUE	TRUE	10	0.66%	70.13%	1.90%	27.31%
7:	10000	TRUE	power	TRUE	TRUE	5	48.22%	3.19%	41.57%	7.02%
8:	10000	TRUE	typeI	TRUE	TRUE	5	0.69%	68.11%	1.93%	29.27%
9:	9900	TRUE	power	FALSE	TRUE	10	50.46%	3.36%	39.87%	6.30%
10:	10000	TRUE	typeI	FALSE	TRUE	10	0.44%	0.23%	1.71%	97.62%
11:	9900	TRUE	power	FALSE	TRUE	5	48.22%	3.18%	42.25%	6.34%
12:	10000	TRUE	typeI	FALSE	TRUE	5	0.55%	0.09%	1.75%	97.61%
13:	9900	TRUE	power	FALSE	FALSE	10	51.20%	3.32%	39.46%	6.01%
14:	10000	TRUE	typeI	FALSE	FALSE	10	0.58%	0.10%	1.69%	97.63%
15:	9900	TRUE	power	FALSE	FALSE	5	48.71%	3.14%	41.95%	6.20%
16:	10000	TRUE	typeI	FALSE	FALSE	5	0.62%	0.02%	1.74%	97.62%
17:	10000	FALSE	power	TRUE	FALSE	5	47.04%	2.46%	43.34%	7.16%
18:	9900	FALSE	typeI	TRUE	FALSE	5	0.82%	67.97%	1.88%	29.33%

Method 3:

	N	missing	hypo	binding	fixC	ar	decision.eff	decision.fut	final.eff	final.fut
1:	10000	TRUE	power	TRUE	FALSE	10	54.76%	3.19%	35.42%	6.63%
2:	10000	TRUE	typeI	TRUE	FALSE	10	0.88%	68.45%	1.80%	28.87%
3:	10000	TRUE	power	TRUE	FALSE	5	49.73%	3.32%	40.05%	6.90%
4:	10000	TRUE	typeI	TRUE	FALSE	5	0.80%	67.87%	1.90%	29.43%
5:	10000	TRUE	power	TRUE	TRUE	10	54.76%	3.19%	35.42%	6.63%
6:	10000	TRUE	typeI	TRUE	TRUE	10	0.88%	68.45%	1.80%	28.87%
7:	10000	TRUE	power	TRUE	TRUE	5	49.73%	3.32%	40.05%	6.90%
8:	10000	TRUE	typeI	TRUE	TRUE	5	0.80%	67.87%	1.90%	29.43%
9:	9900	TRUE	power	FALSE	TRUE	10	54.39%	3.44%	36.02%	6.14%
10:	10000	TRUE	typeI	FALSE	TRUE	10	0.61%	0.36%	1.72%	97.31%
11:	9900	TRUE	power	FALSE	TRUE	5	49.62%	3.29%	40.85%	6.24%
12:	10000	TRUE	typeI	FALSE	TRUE	5	0.59%	0.13%	1.75%	97.53%
13:	9900	TRUE	power	FALSE	FALSE	10	54.39%	3.44%	36.02%	6.14%
14:	10000	TRUE	typeI	FALSE	FALSE	10	0.61%	0.36%	1.72%	97.31%
15:	9900	TRUE	power	FALSE	FALSE	5	49.62%	3.29%	40.85%	6.24%
16:	10000	TRUE	typeI	FALSE	FALSE	5	0.59%	0.13%	1.75%	97.53%
17:	10000	FALSE	power	TRUE	FALSE	5	47.93%	2.75%	42.16%	7.16%
18:	9900	FALSE	typeI	TRUE	FALSE	5	0.77%	66.12%	1.89%	31.22%

Relative frequency of stopping for with a threshold below 1.96:

	scenario	missing	method	binding	fixC	ar	hypo	N	rejection	rejectionBelow196
1:	1	TRUE	1	TRUE	FALSE	10	power	10000	90.43%	0.43%
2:	1	TRUE	2	TRUE	FALSE	10	power	10000	90.37%	0.47%
3:	2	TRUE	1	TRUE	FALSE	10	typeI	10000	2.76%	0.20%
4:	2	TRUE	2	TRUE	FALSE	10	typeI	10000	2.75%	0.20%
5:	3	TRUE	1	TRUE	FALSE	5	power	10000	90.13%	0.40%
6:	3	TRUE	2	TRUE	FALSE	5	power	10000	90.11%	0.40%
7:	4	TRUE	1	TRUE	FALSE	5	typeI	10000	2.72%	0.10%
8:	4	TRUE	2	TRUE	FALSE	5	typeI	10000	2.72%	0.10%
9:	13	TRUE	1	FALSE	FALSE	10	power	9900	90.74%	0.54%
10:	13	TRUE	2	FALSE	FALSE	10	power	9900	90.67%	0.56%
11:	14	TRUE	1	FALSE	FALSE	10	typeI	10000	2.29%	0.15%
12:	14	TRUE	2	FALSE	FALSE	10	typeI	10000	2.27%	0.13%
13:	15	TRUE	1	FALSE	FALSE	5	power	9900	90.67%	0.35%
14:	15	TRUE	2	FALSE	FALSE	5	power	9900	90.66%	0.36%
15:	16	TRUE	1	FALSE	FALSE	5	typeI	10000	2.36%	0.07%
16:	16	TRUE	2	FALSE	FALSE	5	typeI	10000	2.36%	0.07%
17:	17	FALSE	1	TRUE	FALSE	5	power	10000	90.38%	0.43%
18:	17	FALSE	2	TRUE	FALSE	5	power	10000	90.38%	0.43%
19:	18	FALSE	1	TRUE	FALSE	5	typeI	9900	2.70%	0.10%
20:	18	FALSE	2	TRUE	FALSE	5	typeI	9900	2.70%	0.10%

2.2 3 stages

Relative frequency of stopping for efficacy/futility at decision/final

- Method 1

	N	missing	hypo	binding	fixC	ar	dec1.eff	dec1.fut	dec2.eff	dec2.fut	final.eff	final.fut
1:	10000		TRUE	power	TRUE	FALSE	10	28.83%	1.34%	34.78%	2.69%	27.35%	5.01%
2:	10000		TRUE	typeI	TRUE	FALSE	10	0.47%	47.36%	0.63%	35.07%	1.36%	15.11%
3:	10000		TRUE	power	TRUE	FALSE	5	26.51%	1.38%	34.74%	2.85%	29.37%	5.15%
4:	10000		TRUE	typeI	TRUE	FALSE	5	0.44%	44.88%	0.69%	35.90%	1.39%	16.70%
5:	10000		TRUE	power	TRUE	TRUE	10	28.46%	1.71%	34.49%	2.98%	27.35%	5.01%
6:	10000		TRUE	typeI	TRUE	TRUE	10	0.34%	47.49%	0.55%	35.15%	1.36%	15.11%
7:	10000		TRUE	power	TRUE	TRUE	5	26.31%	1.58%	34.53%	3.06%	29.37%	5.15%
8:	10000		TRUE	typeI	TRUE	TRUE	5	0.41%	44.91%	0.61%	35.98%	1.39%	16.70%
9:	10000		TRUE	power	FALSE	TRUE	10	28.18%	1.89%	35.13%	2.93%	26.70%	5.17%
10:	9931		TRUE	typeI	FALSE	TRUE	10	0.35%	0.14%	0.49%	0.40%	1.45%	97.16%
11:	10000		TRUE	power	FALSE	TRUE	5	26.02%	1.75%	35.41%	2.97%	28.51%	5.34%
12:	10000		TRUE	typeI	FALSE	TRUE	5	0.42%	0.01%	0.58%	0.08%	1.50%	97.41%
13:	10000		TRUE	power	FALSE	FALSE	10	28.52%	1.55%	35.38%	2.68%	26.70%	5.17%
14:	9931		TRUE	typeI	FALSE	FALSE	10	0.44%	0.05%	0.55%	0.34%	1.45%	97.16%
15:	10000		TRUE	power	FALSE	FALSE	5	26.21%	1.56%	35.59%	2.79%	28.51%	5.34%
16:	10000		TRUE	typeI	FALSE	FALSE	5	0.43%	0	0.59%	0.07%	1.50%	97.41%
17:	10000		FALSE	power	TRUE	FALSE	5	25.38%	1.48%	34.27%	2.45%	30.20%	6.22%
18:	10000		FALSE	typeI	TRUE	FALSE	5	0.35%	42.84%	0.67%	36.11%	1.63%	18.40%

- Method 2

	N	missing	hypo	binding	fixC	ar	dec1.eff	dec1.fut	dec2.eff	dec2.fut	final.eff	final.fut
1:	10000		TRUE	power	TRUE	FALSE	10	28.87%	1.42%	34.79%	2.82%	27.19%	4.91%
2:	10000		TRUE	typeI	TRUE	FALSE	10	0.47%	47.79%	0.65%	35.40%	1.39%	14.30%
3:	10000		TRUE	power	TRUE	FALSE	5	26.53%	1.38%	34.80%	2.86%	29.28%	5.15%
4:	10000		TRUE	typeI	TRUE	FALSE	5	0.44%	44.92%	0.69%	35.99%	1.39%	16.57%
5:	10000		TRUE	power	TRUE	TRUE	10	28.18%	1.51%	34.40%	2.85%	27.86%	5.20%
6:	10000		TRUE	typeI	TRUE	TRUE	10	0.33%	44.96%	0.53%	36.43%	1.38%	16.37%
7:	10000		TRUE	power	TRUE	TRUE	5	26.18%	1.41%	34.45%	2.84%	29.71%	5.41%
8:	10000		TRUE	typeI	TRUE	TRUE	5	0.41%	43.53%	0.59%	36.40%	1.43%	17.64%
9:	10000		TRUE	power	FALSE	TRUE	10	28.03%	1.62%	35.14%	2.82%	27.10%	5.29%
10:	9931		TRUE	typeI	FALSE	TRUE	10	0.35%	0.12%	0.48%	0.35%	1.48%	97.21%
11:	10000		TRUE	power	FALSE	TRUE	5	25.81%	1.60%	35.45%	2.72%	28.86%	5.56%
12:	10000		TRUE	typeI	FALSE	TRUE	5	0.40%	0.01%	0.59%	0.07%	1.52%	97.41%
13:	10000		TRUE	power	FALSE	FALSE	10	28.53%	1.61%	35.47%	2.88%	26.49%	5.02%
14:	9931		TRUE	typeI	FALSE	FALSE	10	0.44%	0.05%	0.52%	0.40%	1.45%	97.13%
15:	10000		TRUE	power	FALSE	FALSE	5	26.21%	1.56%	35.66%	2.81%	28.44%	5.32%

16:	10000	TRUE	typeI	FALSE	FALSE	5	0.43%	0	0.60%	0.07%	1.49%	97.41%
17:	10000	FALSE	power	TRUE	FALSE	5	25.42%	1.50%	34.24%	2.50%	30.15%	6.19%
18:	10000	FALSE	typeI	TRUE	FALSE	5	0.35%	42.87%	0.67%	36.23%	1.63%	18.25%

- Method 3

	N	missing	hypo	binding	fixC	ar	dec1.eff	dec1.fut	dec2.eff	dec2.fut	final.eff	final.fut
1:	10000	TRUE	power	TRUE	FALSE	10	31.44%	1.68%	35.60%	2.80%	23.40%	5.08%
2:	10000	TRUE	typeI	TRUE	FALSE	10	0.42%	43.69%	0.61%	36.37%	1.41%	17.50%
3:	10000	TRUE	power	TRUE	FALSE	5	26.95%	1.47%	35.22%	2.96%	28.11%	5.29%
4:	10000	TRUE	typeI	TRUE	FALSE	5	0.41%	43.52%	0.62%	36.31%	1.46%	17.68%
5:	10000	TRUE	power	TRUE	TRUE	10	31.44%	1.68%	35.60%	2.80%	23.40%	5.08%
6:	10000	TRUE	typeI	TRUE	TRUE	10	0.42%	43.69%	0.61%	36.37%	1.41%	17.50%
7:	10000	TRUE	power	TRUE	TRUE	5	26.95%	1.47%	35.22%	2.96%	28.11%	5.29%
8:	10000	TRUE	typeI	TRUE	TRUE	5	0.41%	43.52%	0.62%	36.31%	1.46%	17.68%
9:	10000	TRUE	power	FALSE	TRUE	10	30.84%	1.66%	36.22%	2.90%	23.34%	5.04%
10:	9931	TRUE	typeI	FALSE	TRUE	10	0.41%	0.16%	0.63%	0.58%	1.42%	96.79%
11:	10000	TRUE	power	FALSE	TRUE	5	26.83%	1.67%	35.85%	2.85%	27.36%	5.44%
12:	10000	TRUE	typeI	FALSE	TRUE	5	0.45%	0.02%	0.67%	0.13%	1.52%	97.21%
13:	10000	TRUE	power	FALSE	FALSE	10	30.84%	1.66%	36.22%	2.90%	23.34%	5.04%
14:	9931	TRUE	typeI	FALSE	FALSE	10	0.41%	0.16%	0.63%	0.58%	1.42%	96.79%
15:	10000	TRUE	power	FALSE	FALSE	5	26.83%	1.67%	35.85%	2.85%	27.36%	5.44%
16:	10000	TRUE	typeI	FALSE	FALSE	5	0.45%	0.02%	0.67%	0.13%	1.52%	97.21%
17:	10000	FALSE	power	TRUE	FALSE	5	25.94%	1.64%	34.58%	2.53%	29.05%	6.26%
18:	10000	FALSE	typeI	TRUE	FALSE	5	0.32%	41.33%	0.62%	36.51%	1.58%	19.64%

Relative frequency of stopping for with a threshold below 1.96:

	scenario	missing	method	binding	fixC	ar	hypo	N	rejection	rejectionBelow196
1:	1	TRUE	1	TRUE	FALSE	10	power	10000	90.96%	0.66%
2:	1	TRUE	2	TRUE	FALSE	10	power	10000	90.85%	0.62%
3:	2	TRUE	1	TRUE	FALSE	10	typeI	10000	2.46%	0.21%
4:	2	TRUE	2	TRUE	FALSE	10	typeI	10000	2.51%	0.21%
5:	3	TRUE	1	TRUE	FALSE	5	power	10000	90.62%	0.41%
6:	3	TRUE	2	TRUE	FALSE	5	power	10000	90.61%	0.42%
7:	4	TRUE	1	TRUE	FALSE	5	typeI	10000	2.52%	0.11%
8:	4	TRUE	2	TRUE	FALSE	5	typeI	10000	2.52%	0.11%
9:	13	TRUE	1	FALSE	FALSE	10	power	10000	90.60%	0.59%
10:	13	TRUE	2	FALSE	FALSE	10	power	10000	90.49%	0.57%
11:	14	TRUE	1	FALSE	FALSE	10	typeI	9931	2.45%	0.15%
12:	14	TRUE	2	FALSE	FALSE	10	typeI	9931	2.42%	0.13%
13:	15	TRUE	1	FALSE	FALSE	5	power	10000	90.31%	0.37%
14:	15	TRUE	2	FALSE	FALSE	5	power	10000	90.31%	0.38%
15:	16	TRUE	1	FALSE	FALSE	5	typeI	10000	2.52%	0.02%
16:	16	TRUE	2	FALSE	FALSE	5	typeI	10000	2.52%	0.02%
17:	17	FALSE	1	TRUE	FALSE	5	power	10000	89.85%	0.39%
18:	17	FALSE	2	TRUE	FALSE	5	power	10000	89.81%	0.38%
19:	18	FALSE	1	TRUE	FALSE	5	typeI	10000	2.65%	0.13%
20:	18	FALSE	2	TRUE	FALSE	5	typeI	10000	2.65%	0.13%

3 Bias (True effect: 0.6 under the alternative)

3.1 2 stages

Bias per estimator and method[1]:

	hypo	missing	binding	fixC	ar	biasMLE1	biasMLE2	biasMLE3	biasMUE1	biasMUE2	biasMUE3
1:	power	TRUE	TRUE	FALSE	10	0.01251	0.01233	0.01275	0.00470	0.00452	-0.00450
2:	typeI	TRUE	TRUE	FALSE	10	-0.01673	-0.01655	-0.01713	-0.00518	-0.00508	-0.01539
3:	power	TRUE	TRUE	FALSE	5	0.02412	0.02410	0.02442	0.01141	0.01138	0.00302
4:	typeI	TRUE	TRUE	FALSE	5	-0.02839	-0.02837	-0.02897	-0.01206	-0.01207	-0.02288
5:	power	TRUE	TRUE	TRUE	10	0.01251	0.01278	0.01275	-0.01829	-0.01939	-0.00450
6:	typeI	TRUE	TRUE	TRUE	10	-0.01673	-0.01725	-0.01713	-0.04244	-0.04509	-0.01539
7:	power	TRUE	TRUE	TRUE	5	0.02412	0.02444	0.02442	-0.02060	-0.02149	0.00302
8:	typeI	TRUE	TRUE	TRUE	5	-0.02839	-0.02907	-0.02897	-0.06515	-0.06704	-0.02288
9:	power	TRUE	FALSE	TRUE	10	0.01191	0.01234	0.01241	-0.00291	-0.00536	0.01012
10:	typeI	TRUE	FALSE	TRUE	10	-0.00049	-0.00049	-0.00029	-0.00156	-0.00154	0.00000
11:	power	TRUE	FALSE	TRUE	5	0.02382	0.02410	0.02409	-0.00384	-0.00573	0.01884
12:	typeI	TRUE	FALSE	TRUE	5	-0.00004	-0.00004	0.00004	-0.00057	-0.00056	-0.00010
13:	power	TRUE	FALSE	FALSE	10	0.01191	0.01174	0.01241	0.01785	0.01836	0.01012
14:	typeI	TRUE	FALSE	FALSE	10	-0.00049	-0.00049	-0.00029	-0.00060	-0.00072	0.00000
15:	power	TRUE	FALSE	FALSE	5	0.02382	0.02379	0.02409	0.02577	0.02582	0.01884
16:	typeI	TRUE	FALSE	FALSE	5	-0.00004	-0.00004	0.00004	-0.00002	-0.00002	-0.00010
17:	power	FALSE	TRUE	FALSE	5	0.02542	0.02542	0.02598	0.01365	0.01366	0.00371
18:	typeI	FALSE	TRUE	FALSE	5	-0.02471	-0.02472	-0.02520	-0.00941	-0.00941	-0.02205

Median bias [2] per estimator and method:

	hypo	missing	binding	fixC	ar	mbiasMLE1	mbiasMLE2	mbiasMLE3	mbiasMUE1	mbiasMUE2	mbiasMUE3
1:	power	TRUE	TRUE	FALSE	10	0.0218	0.0218	0.0198	-0.00560	-0.00550	-0.01340
2:	typeI	TRUE	TRUE	FALSE	10	-0.0272	-0.0265	-0.0296	-0.00520	-0.00606	-0.02692
3:	power	TRUE	TRUE	FALSE	5	0.0472	0.0472	0.0471	-0.00425	-0.00425	-0.00760
4:	typeI	TRUE	TRUE	FALSE	5	-0.0446	-0.0444	-0.0478	-0.00700	-0.00746	-0.02836
5:	power	TRUE	TRUE	TRUE	10	0.0218	0.0216	0.0198	-0.02751	-0.02951	-0.01340
6:	typeI	TRUE	TRUE	TRUE	10	-0.0272	-0.0292	-0.0296	-0.08467	-0.08715	-0.02692
7:	power	TRUE	TRUE	TRUE	5	0.0472	0.0471	0.0471	-0.02956	-0.03136	-0.00760
8:	typeI	TRUE	TRUE	TRUE	5	-0.0446	-0.0472	-0.0478	-0.10726	-0.10396	-0.02836
9:	power	TRUE	FALSE	TRUE	10	0.0256	0.0257	0.0261	-0.00808	-0.01103	0.00434
10:	typeI	TRUE	FALSE	TRUE	10	-0.0040	-0.0040	-0.0040	-0.00516	-0.00516	-0.00301
11:	power	TRUE	FALSE	TRUE	5	0.0499	0.0495	0.0503	-0.01402	-0.01674	0.00559
12:	typeI	TRUE	FALSE	TRUE	5	-0.0040	-0.0040	-0.0040	-0.00455	-0.00455	-0.00396
13:	power	TRUE	FALSE	FALSE	10	0.0256	0.0256	0.0261	0.01372	0.01458	0.00434
14:	typeI	TRUE	FALSE	FALSE	10	-0.0040	-0.0040	-0.0040	-0.00440	-0.00450	-0.00301
15:	power	TRUE	FALSE	FALSE	5	0.0499	0.0499	0.0503	0.00871	0.00881	0.00559

[1] e.g. `biasMLE1` mixed model estimator (treatment effect), method 1 (boundaries)

[2] Relative frequency at which the estimate is greater than the truth minus 0.5

```
16: typeI    TRUE   FALSE FALSE  5   -0.0040   -0.0040   -0.0040  -0.00420  -0.00420  -0.00396
17: power   FALSE    TRUE FALSE  5    0.0479    0.0479    0.0481  -0.00425  -0.00435  -0.01240
18: typeI   FALSE    TRUE FALSE  5   -0.0417   -0.0418   -0.0437  -0.00425  -0.00445  -0.02922
```

3.2 3 stages

Bias per estimator and method[3]:

	hypo	missing	binding	fixC	ar	biasMLE1	biasMLE2	biasMLE3	biasMUE1	biasMUE2	biasMUE3
1:	power	TRUE	TRUE	FALSE	10	0.0240	0.0238	0.0255	0.0161	0.0159	0.0074
2:	typeI	TRUE	TRUE	FALSE	10	-0.0281	-0.0279	-0.0280	-0.0134	-0.0129	-0.0249
3:	power	TRUE	TRUE	FALSE	5	0.0380	0.0380	0.0388	0.0216	0.0217	0.0130
4:	typeI	TRUE	TRUE	FALSE	5	-0.0447	-0.0447	-0.0448	-0.0226	-0.0226	-0.0348
5:	power	TRUE	TRUE	TRUE	10	0.0240	0.0245	0.0255	-0.0076	-0.0083	0.0074
6:	typeI	TRUE	TRUE	TRUE	10	-0.0281	-0.0283	-0.0280	-0.0562	-0.0582	-0.0249
7:	power	TRUE	TRUE	TRUE	5	0.0380	0.0386	0.0388	-0.0105	-0.0104	0.0130
8:	typeI	TRUE	TRUE	TRUE	5	-0.0447	-0.0449	-0.0448	-0.0848	-0.0859	-0.0348
9:	power	TRUE	FALSE	TRUE	10	0.0242	0.0246	0.0253	0.0150	0.0129	0.0274
10:	typeI	TRUE	FALSE	TRUE	10	0.0024	0.0023	0.0027	0.0010	0.0011	0.0031
11:	power	TRUE	FALSE	TRUE	5	0.0380	0.0385	0.0388	0.0133	0.0112	0.0353
12:	typeI	TRUE	FALSE	TRUE	5	0.0035	0.0035	0.0038	0.0029	0.0029	0.0038
13:	power	TRUE	FALSE	FALSE	10	0.0242	0.0241	0.0253	0.0348	0.0356	0.0274
14:	typeI	TRUE	FALSE	FALSE	10	0.0024	0.0024	0.0027	0.0021	0.0019	0.0031
15:	power	TRUE	FALSE	FALSE	5	0.0380	0.0380	0.0388	0.0427	0.0428	0.0353
16:	typeI	TRUE	FALSE	FALSE	5	0.0035	0.0035	0.0038	0.0032	0.0033	0.0038
17:	power	FALSE	TRUE	FALSE	5	0.0373	0.0372	0.0379	0.0221	0.0220	0.0122
18:	typeI	FALSE	TRUE	FALSE	5	-0.0420	-0.0419	-0.0423	-0.0203	-0.0202	-0.0344

Median bias [4] per estimator and method:

	hypo	missing	binding	fixC	ar	mbiasMLE1	mbiasMLE2	mbiasMLE3	mbiasMUE1	mbiasMUE2	mbiasMUE3
1:	power	TRUE	TRUE	FALSE	10	0.0348	0.0346	0.0360	0.00130	0.00120	-0.0128
2:	typeI	TRUE	TRUE	FALSE	10	-0.0428	-0.0423	-0.0426	0.00205	0.00200	-0.0161
3:	power	TRUE	TRUE	FALSE	5	0.0577	0.0576	0.0573	-0.00085	-0.00085	-0.0185
4:	typeI	TRUE	TRUE	FALSE	5	-0.0589	-0.0588	-0.0589	-0.00455	-0.00415	-0.0195
5:	power	TRUE	TRUE	TRUE	10	0.0348	0.0350	0.0360	-0.03457	-0.03658	-0.0128
6:	typeI	TRUE	TRUE	TRUE	10	-0.0428	-0.0426	-0.0426	-0.02798	-0.03293	-0.0161
7:	power	TRUE	TRUE	TRUE	5	0.0577	0.0578	0.0573	-0.05581	-0.05901	-0.0185
8:	typeI	TRUE	TRUE	TRUE	5	-0.0589	-0.0589	-0.0589	-0.04987	-0.05342	-0.0192
9:	power	TRUE	FALSE	TRUE	10	0.0413	0.0408	0.0420	-0.00557	-0.01015	0.0046
10:	typeI	TRUE	FALSE	TRUE	10	0.0012	0.0012	0.0012	-0.00101	-0.00066	0.0026
11:	power	TRUE	FALSE	TRUE	5	0.0633	0.0633	0.0629	-0.03128	-0.03685	0.0062
12:	typeI	TRUE	FALSE	TRUE	5	0.0015	0.0015	0.0015	0.00075	0.00070	0.0023
13:	power	TRUE	FALSE	FALSE	10	0.0413	0.0415	0.0420	0.02261	0.02398	0.0046
14:	typeI	TRUE	FALSE	FALSE	10	0.0012	0.0012	0.0012	-0.00025	-0.00010	0.0026
15:	power	TRUE	FALSE	FALSE	5	0.0633	0.0630	0.0629	0.02410	0.02421	0.0063
16:	typeI	TRUE	FALSE	FALSE	5	0.0015	0.0015	0.0015	0.00085	0.00075	0.0022
17:	power	FALSE	TRUE	FALSE	5	0.0584	0.0586	0.0585	0.00285	0.00275	-0.0157

[3] e.g. `biasMLE1` mixed model estimator (treatment effect), method 1 (boundaries)

[4] Relative frequency at which the estimate is greater than the truth minus 0.5

```
18: typeI   FALSE    TRUE FALSE  5   -0.0589   -0.0584   -0.0587   0.00190   0.00230   -0.0117
```

4 Distribution of the estimates

4.1 2 stages

Distribution of the estimates:

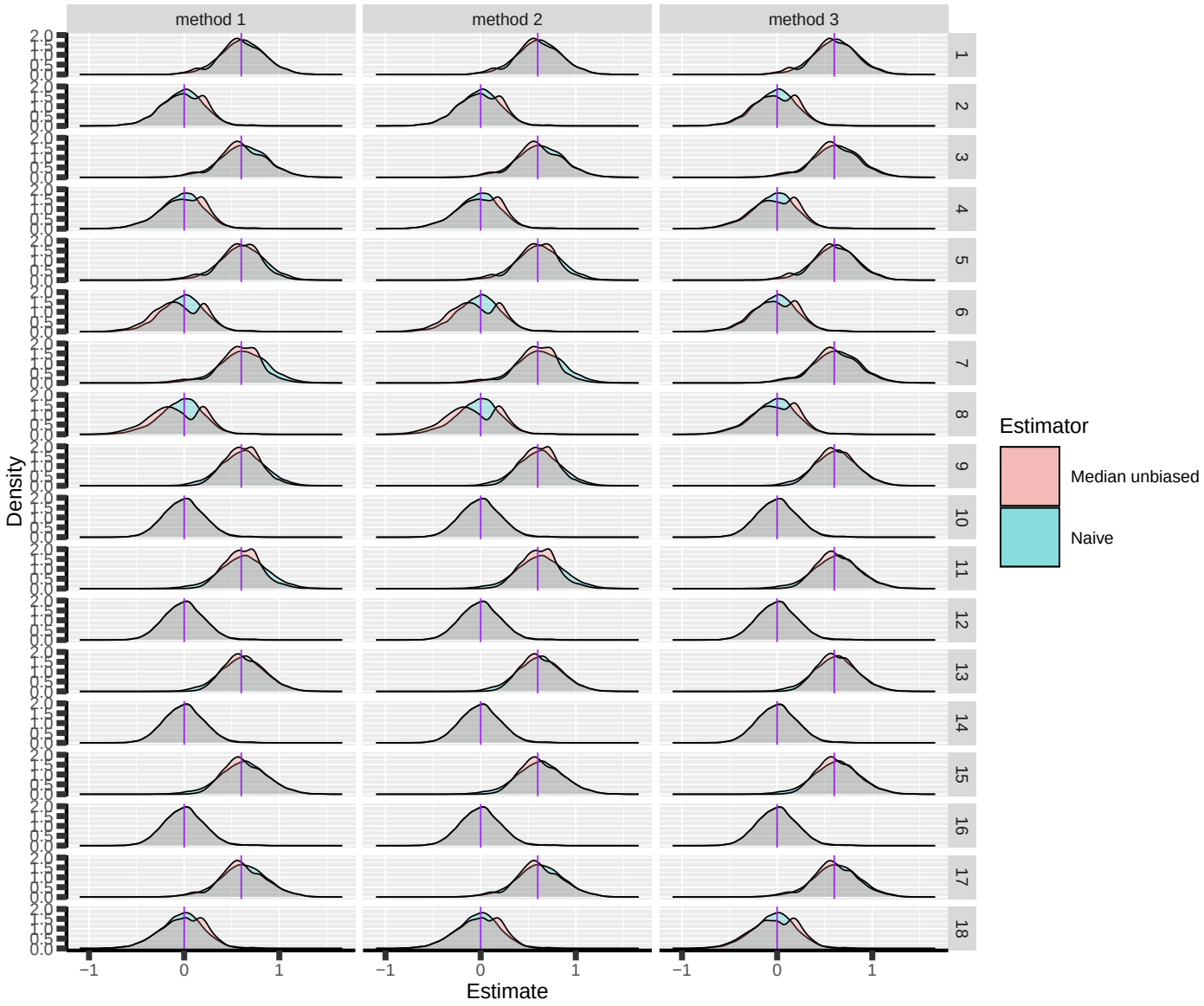

Figure 5: Naive and Median unbiased estimate distribution over all simulations. Each row correspond to a different scenario

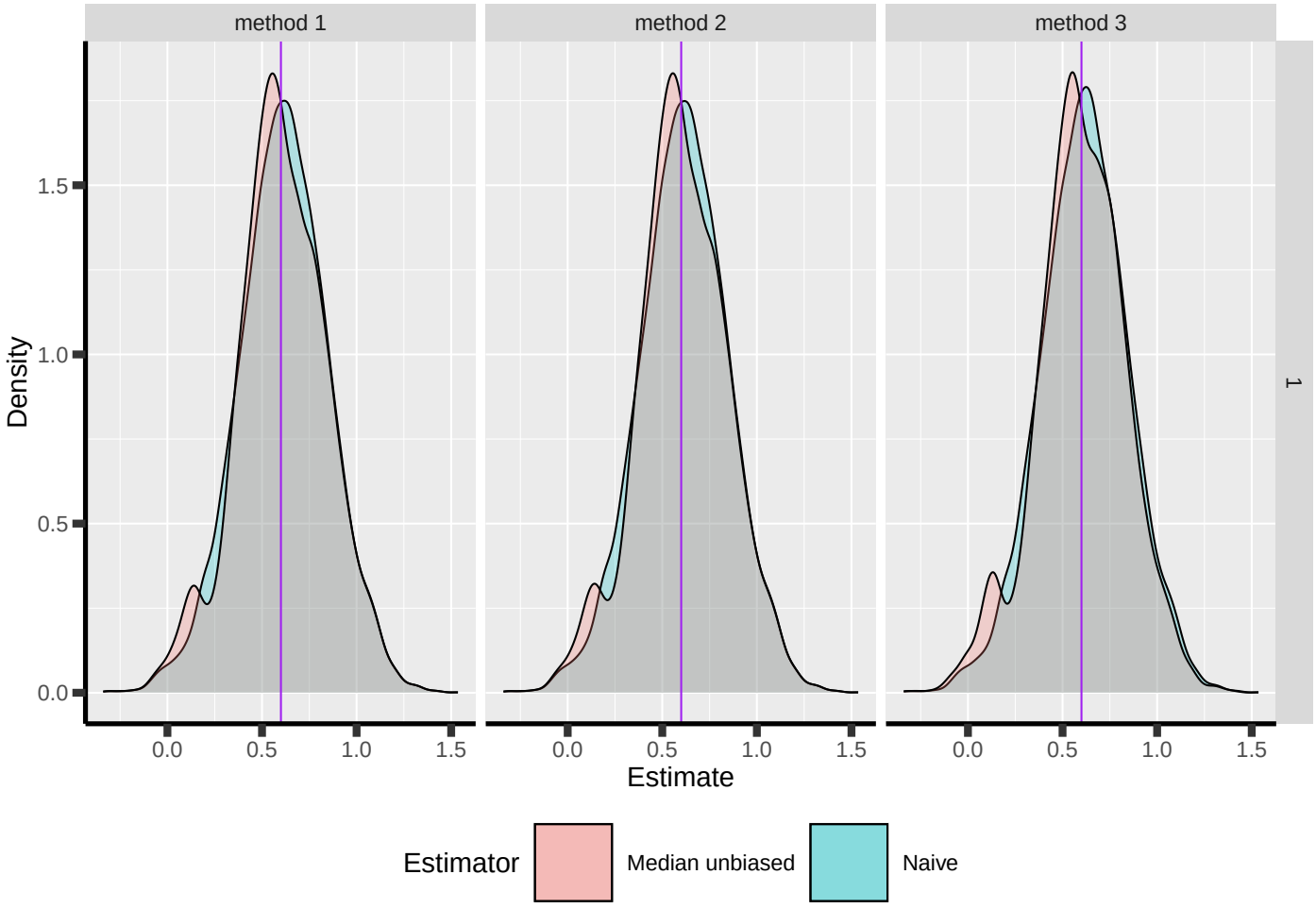

Figure 6: Same but specific to scenario 1

Distribution of the median unbiased estimate conditional to the stage:

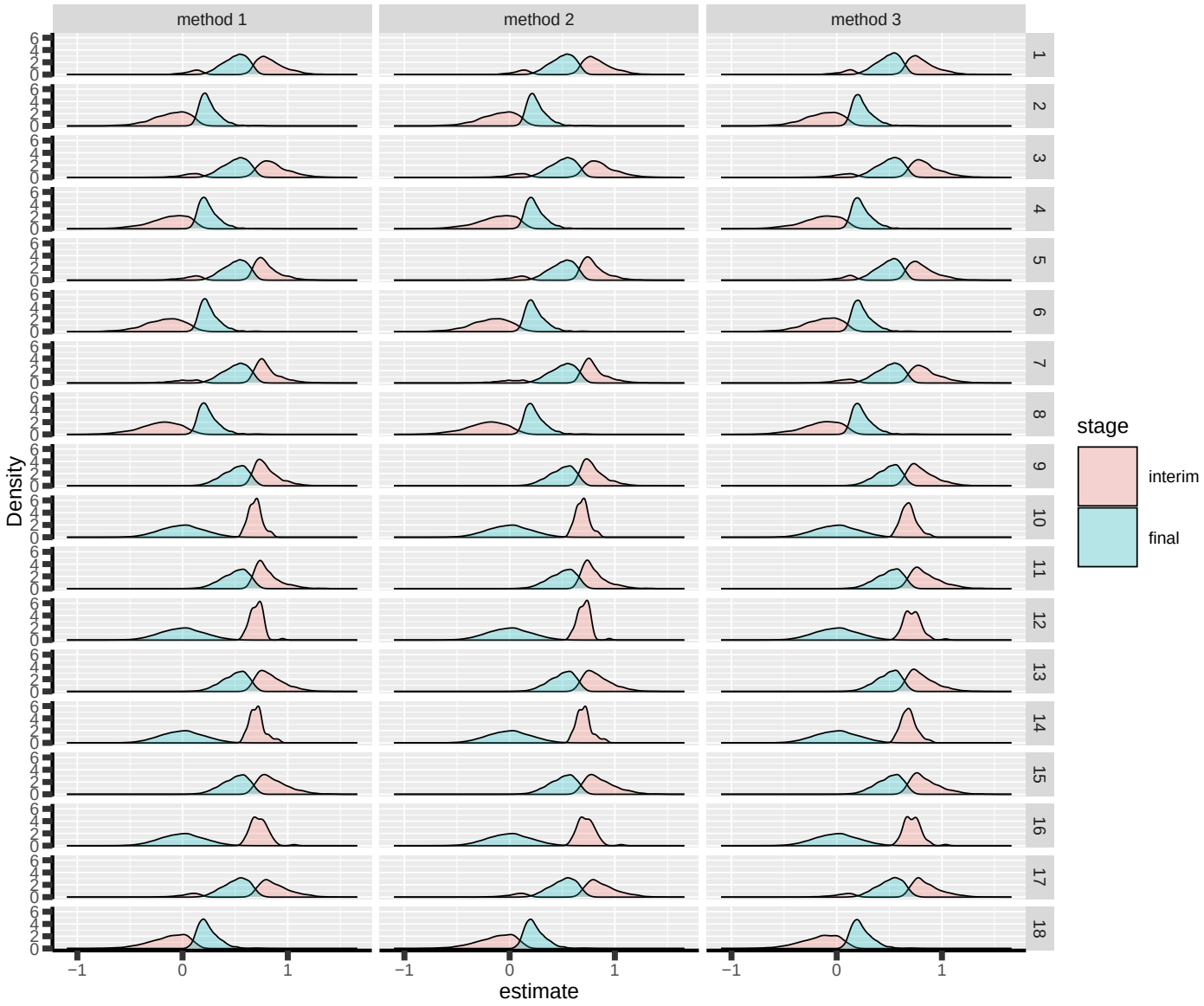

Figure 7: Median unbiased estimate distribution conditional to the stage. Each row correspond to a different scenario.

4.2 3 stages

Distribution of the estimates:

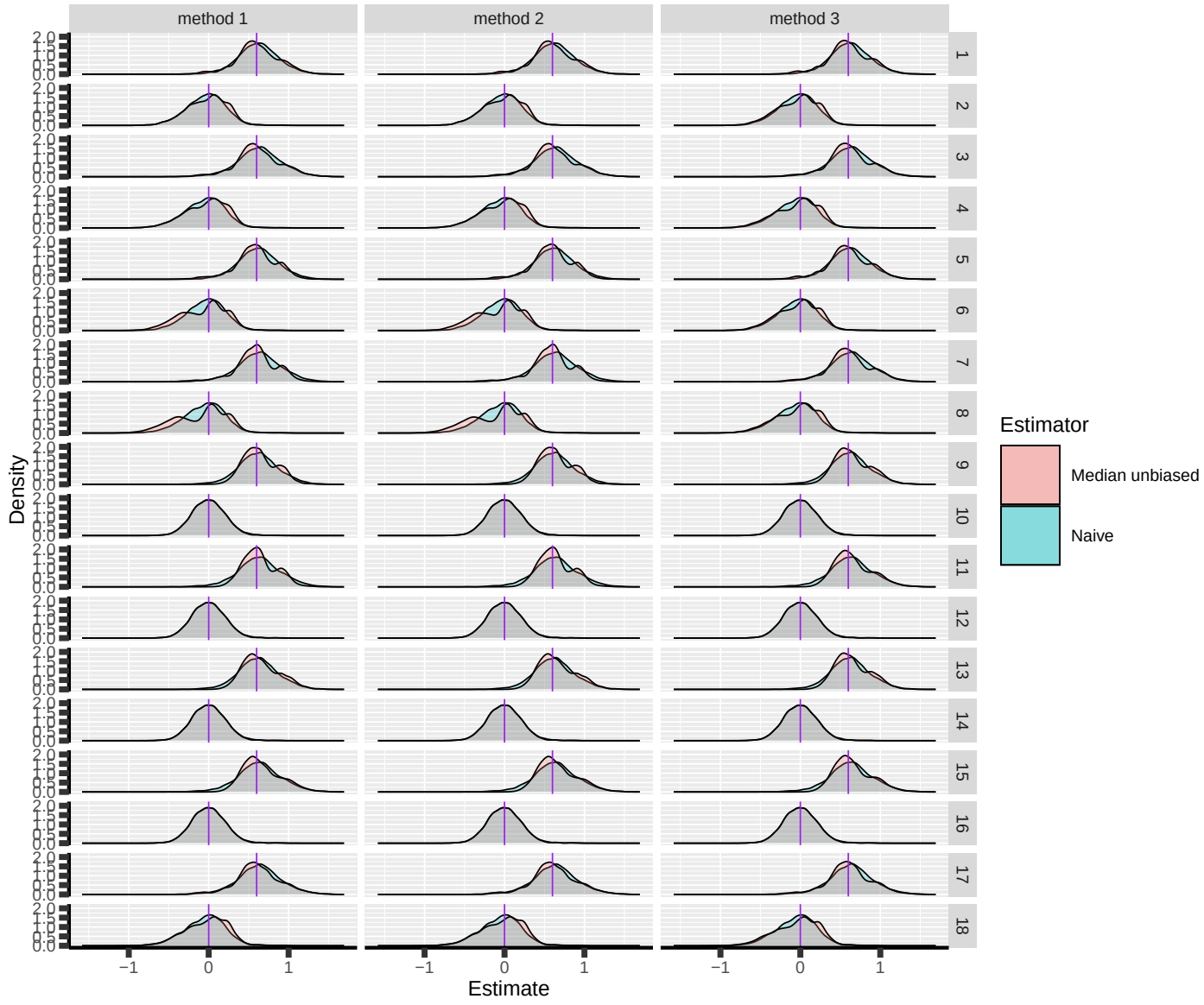

Figure 8: Naive and Median unbiased estimate distribution over all simulations. Each row correspond to a different scenario

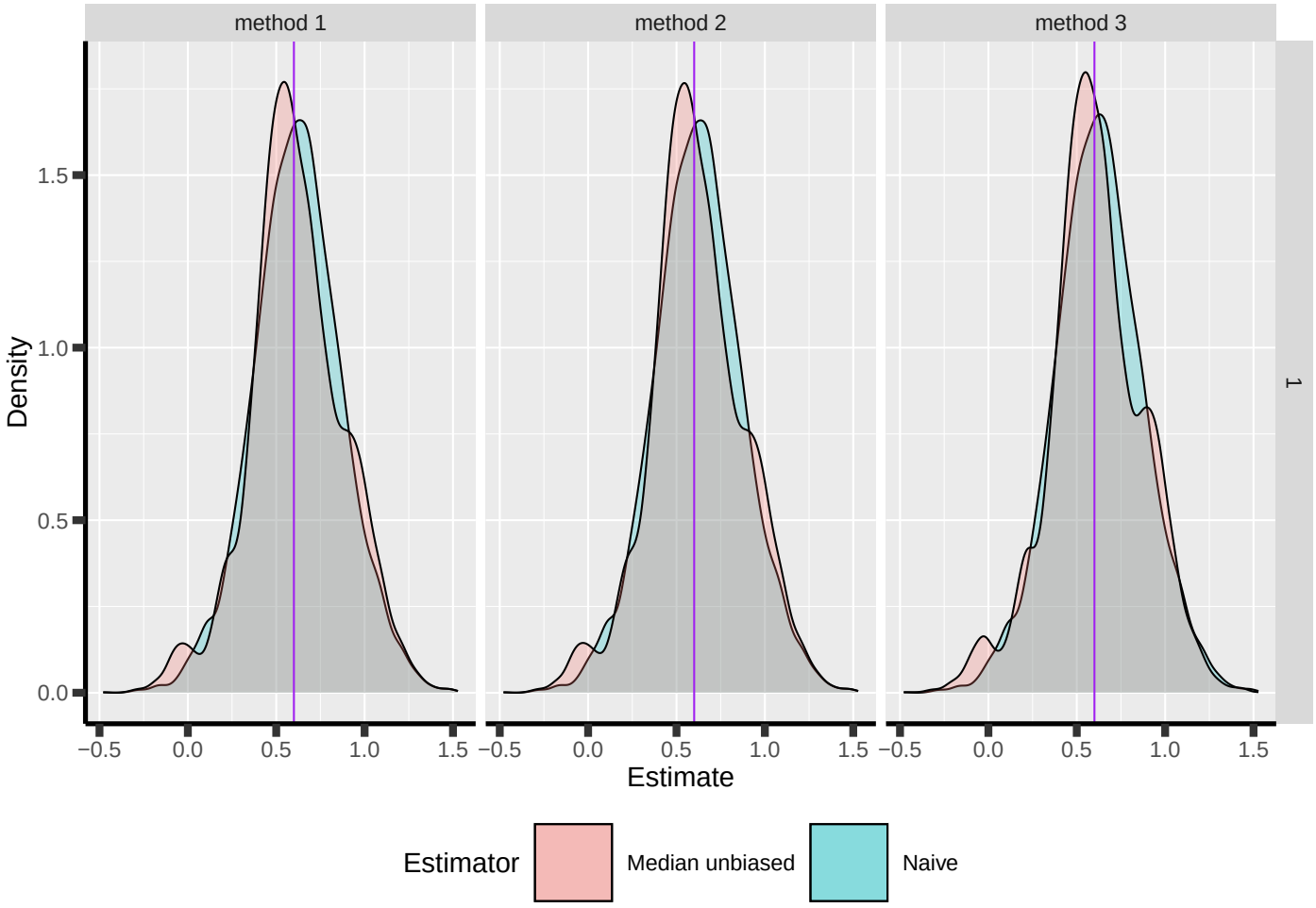

Figure 9: Same but specific to scenario 1

Distribution of the median unbiased estimate conditional to the stage:

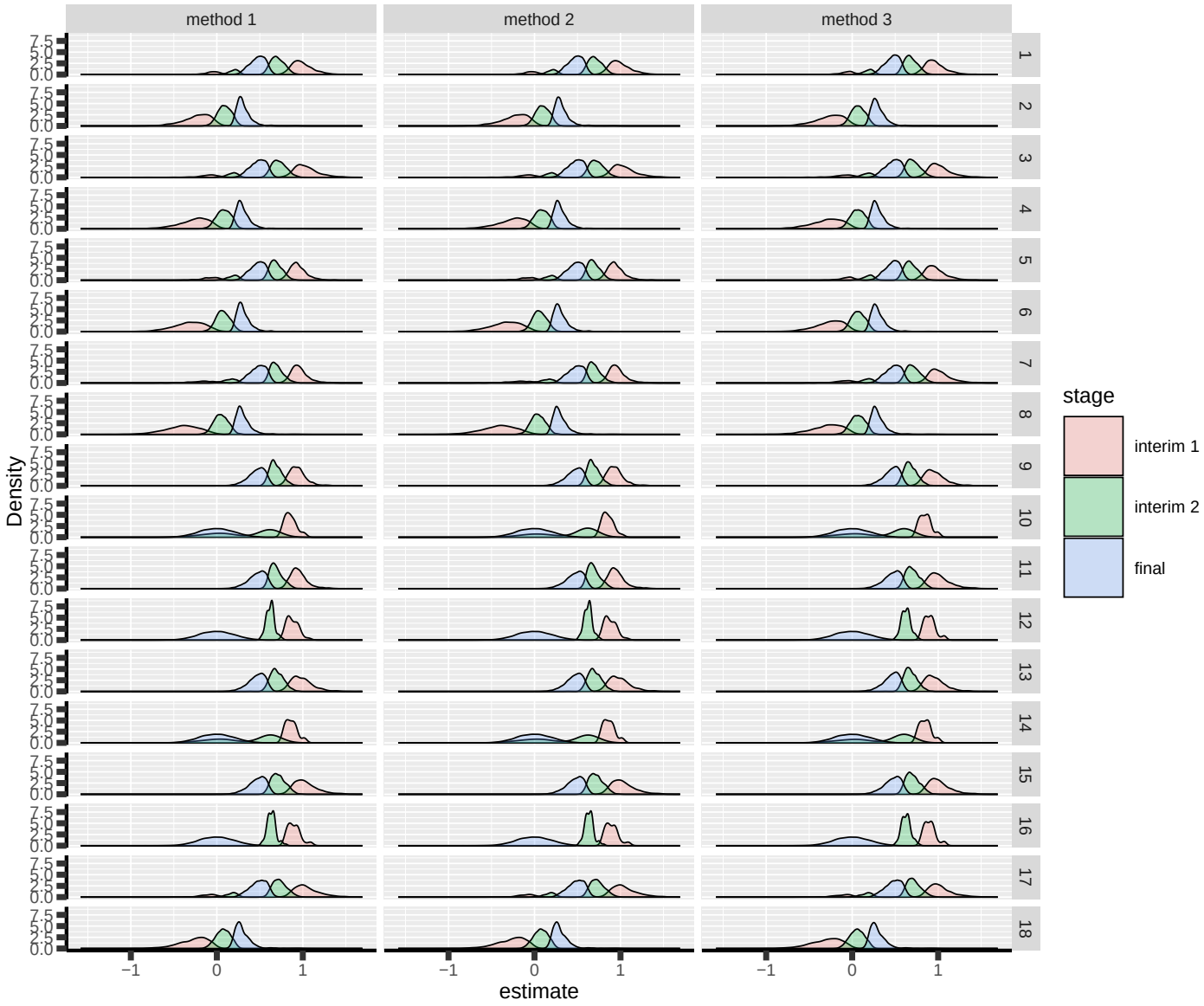

Figure 10: Median unbiased estimate distribution conditional to the stage. Each row correspond to a different scenario.

5 Special cases

5.1 2 stages

Reason for stopping (efficacy, futility, Imax reached), continuing the trial (decreasing information, no boundary crossed), or concluding (stop for futility at interim):

	scenario	1	2	3	4	5	6	7	8
reason	method								
efficacy	1	5093	86	4874	80	5093	86	4874	80
	2	5093	86	4874	81	5068	86	4861	77
	3	5553	128	5028	91	5553	128	5028	91
futility	1	320	7179	299	6950	320	7179	299	6950
	2	349	7269	301	6960	274	6993	280	6803
	3	242	6805	277	6776	242	6805	277	6776
no boundary crossed	1	4587	2735	4827	2970	4587	2735	4827	2970
	2	4558	2645	4825	2959	4658	2921	4859	3120
	3	4205	3067	4695	3133	4205	3067	4695	3133
stop for futility at interim	1	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0
	3	10	3	0	0	10	3	0	0

	scenario	9	10	11	12	13	14	15	16	17	18
reason	method										
efficacy	1	5039	68	4821	64	5039	68	4821	64	4700	82
	2	5028	67	4806	64	5039	68	4821	64	4700	82
	3	5460	97	4959	72	5460	97	4959	72	4845	90
futility	1	338	7164	309	6964	338	7164	309	6964	250	6719
	2	301	6978	283	6833	359	7258	312	6973	250	6728
	3	266	6800	279	6816	266	6800	279	6816	223	6532
no boundary crossed	1	4523	2768	4770	2972	4523	2768	4770	2972	5050	3099
	2	4571	2955	4811	3103	4502	2674	4767	2963	5050	3090
	3	4174	3103	4662	3112	4174	3103	4662	3112	4932	3278
stop for futility at interim	1	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	0	0
	3	15	0	0	0	15	0	0	0	1	0

5.2 3 stages

Reason for stopping (efficacy, futility, Imax reached), continuing the trial (decreasing information, no boundary crossed), or concluding (stop for futility at interim):

	scenario	1	2	3	4	5	6	7	8
reason	method								
efficacy	1	6306	115	6116	113	6306	115	6116	113
	2	6305	115	6123	113	6275	114	6095	111
	3	6785	155	6270	120	6785	155	6270	120
futility	1	444	8228	432	8078	444	8228	432	8078
	2	469	8306	434	8091	412	8102	393	7982
	3	357	7943	390	7966	357	7943	390	7966
Imax reached	1	14	10	0	0	14	10	0	0
	2	16	10	0	0	7	9	0	0
	3	10	11	0	0	10	11	0	0
no boundary crossed	1	10219	6864	10663	7277	10219	6864	10663	7277
	2	10181	6743	10652	7260	10337	7246	10753	7513
	3	9536	7480	10498	7521	9536	7480	10498	7521
stop for futility at interim	1	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0
	3	24	2	3	0	24	2	3	0

	scenario	9	10	11	12	13	14	15	16	17
reason	method									
efficacy	1	6334	116	6177	109	6334	116	6177	109	5961
	2	6322	113	6160	107	6337	116	6182	110	5963
	3	6782	156	6325	127	6782	156	6325	127	6105
futility	1	465	12836	438	12525	465	12836	438	12525	397
	2	427	12493	398	12326	496	12946	442	12540	403
	3	368	12227	395	12319	368	12227	395	12319	364
Imax reached	1	14	22	0	0	14	22	0	0	0
	2	12	17	0	0	16	25	0	0	0
	3	12	22	0	0	12	22	0	0	0
no boundary crossed	1	10180	6839	10608	7323	10180	6839	10608	7323	10956
	2	10274	7192	10701	7526	10137	6726	10599	7307	10942
	3	9588	7400	10430	7507	9588	7400	10430	7507	10773
stop for futility at interim	1	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	0
	3	27	0	1	0	27	0	1	0	0

6 Reversal probability

6.1 2 stages

Percentage of time we observe a reversal:

	N	hypo	missing	ar	binding	fixC	fu2eff_1	fu2eff_2	fu2eff_3	eff2fu_1	eff2fu_2	eff2fu_3
1:	10000	power	TRUE	10	TRUE	FALSE	0.43%	0.50%	0	0.13%	0.14%	0.77%
2:	10000	typeI	TRUE	10	TRUE	FALSE	0.13%	0.13%	0	0.13%	0.13%	0.40%
3:	10000	power	TRUE	5	TRUE	FALSE	0.05%	0.05%	0	0.05%	0.05%	0.55%
4:	10000	typeI	TRUE	5	TRUE	FALSE	0.03%	0.03%	0	0.02%	0.02%	0.11%
5:	10000	power	TRUE	10	TRUE	TRUE	0.24%	0.19%	0	0.37%	0.37%	0.77%
6:	10000	typeI	TRUE	10	TRUE	TRUE	0.04%	0.04%	0	0.24%	0.24%	0.40%
7:	10000	power	TRUE	5	TRUE	TRUE	0	0	0	0.40%	0.39%	0.55%
8:	10000	typeI	TRUE	5	TRUE	TRUE	0	0	0	0.09%	0.08%	0.11%
9:	9900	power	TRUE	10	FALSE	TRUE	0.21%	0.17%	0	0.49%	0.49%	0.76%
10:	10000	typeI	TRUE	10	FALSE	TRUE	0	0	0	0.23%	0.23%	0.36%
11:	9900	power	TRUE	5	FALSE	TRUE	0	0	0	0.35%	0.32%	0.47%
12:	10000	typeI	TRUE	5	FALSE	TRUE	0	0	0	0.09%	0.09%	0.13%
13:	9900	power	TRUE	10	FALSE	FALSE	0.40%	0.46%	0	0.15%	0.16%	0.76%
14:	10000	typeI	TRUE	10	FALSE	FALSE	0	0	0	0.08%	0.10%	0.36%
15:	9900	power	TRUE	5	FALSE	FALSE	0.04%	0.05%	0	0.04%	0.04%	0.47%
16:	10000	typeI	TRUE	5	FALSE	FALSE	0	0	0	0.02%	0.02%	0.13%
17:	10000	power	FALSE	5	TRUE	FALSE	0.08%	0.08%	0	0.04%	0.04%	0.52%
18:	9900	typeI	FALSE	5	TRUE	FALSE	0.02%	0.02%	0	0.03%	0.03%	0.14%

6.2 3 stages

Percentage of time we observe a reversal:

	N	hypo	missing	ar	binding	fixC	fu2eff_1	fu2eff_2	fu2eff_3	eff2fu_1	eff2fu_2	eff2fu_3
1:	10000	power	TRUE	10	TRUE	FALSE	0.57%	0.66%	0	0.15%	0.19%	0.91%
2:	10000	typeI	TRUE	10	TRUE	FALSE	0.16%	0.18%	0	0.22%	0.22%	0.52%
3:	10000	power	TRUE	5	TRUE	FALSE	0.15%	0.16%	0	0.06%	0.06%	0.53%
4:	10000	typeI	TRUE	5	TRUE	FALSE	0.02%	0.02%	0	0.02%	0.02%	0.17%
5:	10000	power	TRUE	10	TRUE	TRUE	0.37%	0.36%	0	0.61%	0.60%	0.91%
6:	10000	typeI	TRUE	10	TRUE	TRUE	0.06%	0.04%	0	0.33%	0.32%	0.52%
7:	10000	power	TRUE	5	TRUE	TRUE	0.05%	0.03%	0	0.37%	0.35%	0.53%
8:	10000	typeI	TRUE	5	TRUE	TRUE	0.01%	0	0	0.12%	0.11%	0.17%
9:	10000	power	TRUE	10	FALSE	TRUE	0.41%	0.39%	0	0.58%	0.56%	0.88%
10:	9931	typeI	TRUE	10	FALSE	TRUE	0	0	0	0.33%	0.30%	0.53%
11:	10000	power	TRUE	5	FALSE	TRUE	0.02%	0.01%	0	0.36%	0.35%	0.57%
12:	10000	typeI	TRUE	5	FALSE	TRUE	0	0	0	0.09%	0.08%	0.15%
13:	10000	power	TRUE	10	FALSE	FALSE	0.66%	0.74%	0	0.24%	0.26%	0.88%
14:	9931	typeI	TRUE	10	FALSE	FALSE	0	0	0	0.18%	0.21%	0.53%
15:	10000	power	TRUE	5	FALSE	FALSE	0.10%	0.12%	0	0.07%	0.07%	0.57%
16:	10000	typeI	TRUE	5	FALSE	FALSE	0	0	0	0.07%	0.07%	0.15%
17:	10000	power	FALSE	5	TRUE	FALSE	0.11%	0.10%	0	0.07%	0.07%	0.53%
18:	10000	typeI	FALSE	5	TRUE	FALSE	0.04%	0.04%	0	0.03%	0.03%	0.16%

7 Logical consistency of p-values/CIs

7.1 Mismatch p-value / boundaries

7.1.1 2 stages

When concluding for futility:

	hypo	missing	ar	binding	fixC	method 1	method 2	method 3
1:	power	TRUE	10	TRUE	FALSE	0	0	0
2:	typeI	TRUE	10	TRUE	FALSE	0	0	0
3:	power	TRUE	5	TRUE	FALSE	0	0	0
4:	typeI	TRUE	5	TRUE	FALSE	0	0	0
5:	power	TRUE	10	TRUE	TRUE	0	0	0
6:	typeI	TRUE	10	TRUE	TRUE	0	0	0
7:	power	TRUE	5	TRUE	TRUE	0	0	0
8:	typeI	TRUE	5	TRUE	TRUE	0	0	0
9:	power	TRUE	10	FALSE	TRUE	0	0	0
10:	typeI	TRUE	10	FALSE	TRUE	0	0	0
11:	power	TRUE	5	FALSE	TRUE	0	0	0
12:	typeI	TRUE	5	FALSE	TRUE	0	0	0
13:	power	TRUE	10	FALSE	FALSE	0	0	0
14:	typeI	TRUE	10	FALSE	FALSE	0	0	0
15:	power	TRUE	5	FALSE	FALSE	0	0	0
16:	typeI	TRUE	5	FALSE	FALSE	0	0	0
17:	power	FALSE	5	TRUE	FALSE	0	0	0
18:	typeI	FALSE	5	TRUE	FALSE	0	0	0

When concluding for efficacy:

	hypo	missing	ar	binding	fixC	method 1	method 2	method 3
1:	power	TRUE	10	TRUE	FALSE	0	0	0
2:	typeI	TRUE	10	TRUE	FALSE	0	0	0
3:	power	TRUE	5	TRUE	FALSE	0	0	0
4:	typeI	TRUE	5	TRUE	FALSE	0	0	0
5:	power	TRUE	10	TRUE	TRUE	0	0	0
6:	typeI	TRUE	10	TRUE	TRUE	0	0	0
7:	power	TRUE	5	TRUE	TRUE	0	0	0
8:	typeI	TRUE	5	TRUE	TRUE	0	0	0
9:	power	TRUE	10	FALSE	TRUE	0	0	0
10:	typeI	TRUE	10	FALSE	TRUE	0	0	0
11:	power	TRUE	5	FALSE	TRUE	0	0	0
12:	typeI	TRUE	5	FALSE	TRUE	0	0	0
13:	power	TRUE	10	FALSE	FALSE	0	0	0
14:	typeI	TRUE	10	FALSE	FALSE	0	0	0

```
15: power    TRUE  5   FALSE FALSE        0        0        0
16: typeI    TRUE  5   FALSE FALSE        0        0        0
17: power   FALSE  5    TRUE FALSE        0        0        0
18: typeI   FALSE  5    TRUE FALSE        0        0        0
```

7.1.2 3 stages

When concluding for futility:

	hypo	missing	ar	binding	fixC	method 1	method 2	method 3
1:	power	TRUE	10	TRUE	FALSE	0	0	0
2:	typeI	TRUE	10	TRUE	FALSE	0	0	0
3:	power	TRUE	5	TRUE	FALSE	0	0	0.10%
4:	typeI	TRUE	5	TRUE	FALSE	0	0.01%	0
5:	power	TRUE	10	TRUE	TRUE	0	0	0
6:	typeI	TRUE	10	TRUE	TRUE	0	0	0
7:	power	TRUE	5	TRUE	TRUE	0	0	0.10%
8:	typeI	TRUE	5	TRUE	TRUE	0	0	0
9:	power	TRUE	10	FALSE	TRUE	0	0	0
10:	typeI	TRUE	10	FALSE	TRUE	0	0	0
11:	power	TRUE	5	FALSE	TRUE	0.10%	0	0
12:	typeI	TRUE	5	FALSE	TRUE	0	0	0
13:	power	TRUE	10	FALSE	FALSE	0	0	0
14:	typeI	TRUE	10	FALSE	FALSE	0	0	0
15:	power	TRUE	5	FALSE	FALSE	0.10%	0	0
16:	typeI	TRUE	5	FALSE	FALSE	0	0	0
17:	power	FALSE	5	TRUE	FALSE	0	0	0
18:	typeI	FALSE	5	TRUE	FALSE	0	0	0

Largest mismatch:

```
[1] 0.02499104799
```

When concluding for efficacy:

	hypo	missing	ar	binding	fixC	method 1	method 2	method 3
1:	power	TRUE	10	TRUE	FALSE	0.01%	0	0
2:	typeI	TRUE	10	TRUE	FALSE	0	0	0
3:	power	TRUE	5	TRUE	FALSE	0	0	0
4:	typeI	TRUE	5	TRUE	FALSE	0	0	0
5:	power	TRUE	10	TRUE	TRUE	0.01%	0	0
6:	typeI	TRUE	10	TRUE	TRUE	0	0	0
7:	power	TRUE	5	TRUE	TRUE	0	0	0
8:	typeI	TRUE	5	TRUE	TRUE	0	0	0
9:	power	TRUE	10	FALSE	TRUE	0	0	0
10:	typeI	TRUE	10	FALSE	TRUE	0	0	0
11:	power	TRUE	5	FALSE	TRUE	0	0	0
12:	typeI	TRUE	5	FALSE	TRUE	0	0	0
13:	power	TRUE	10	FALSE	FALSE	0	0	0.01%
14:	typeI	TRUE	10	FALSE	FALSE	0	0	0
15:	power	TRUE	5	FALSE	FALSE	0	0	0

```
16: typeI    TRUE  5   FALSE FALSE        0        0        0
17: power   FALSE  5    TRUE FALSE        0        0        0
18: typeI   FALSE  5    TRUE FALSE        0        0        0
```

Largest mismatch:

```
[1] 0.02500693409
```

7.2 Mismatch confidence intervals / boundaries

7.2.1 2 stages

When concluding for futility:

	hypo	missing	ar	binding	fixC	method 1	method 2	method 3
1:	power	TRUE	10	TRUE	FALSE	0	0	0
2:	typeI	TRUE	10	TRUE	FALSE	0	0	0
3:	power	TRUE	5	TRUE	FALSE	0	0	0
4:	typeI	TRUE	5	TRUE	FALSE	0	0	0
5:	power	TRUE	10	TRUE	TRUE	0	0	0
6:	typeI	TRUE	10	TRUE	TRUE	0	0	0
7:	power	TRUE	5	TRUE	TRUE	0	0	0
8:	typeI	TRUE	5	TRUE	TRUE	0	0	0
9:	power	TRUE	10	FALSE	TRUE	0 (NA: 37.73%)	0 (NA: 34.80%)	0 (NA: 35.93%)
10:	typeI	TRUE	10	FALSE	TRUE	0 (NA: 0.24%)	0 (NA: 0.24%)	0 (NA: 0.37%)
11:	power	TRUE	5	FALSE	TRUE	0 (NA: 35.87%)	0 (NA: 33.40%)	0 (NA: 34.53%)
12:	typeI	TRUE	5	FALSE	TRUE	0 (NA: 0.09%)	0 (NA: 0.09%)	0 (NA: 0.13%)
13:	power	TRUE	10	FALSE	FALSE	0 (NA: 34.13%)	0 (NA: 35.61%)	0 (NA: 35.93%)
14:	typeI	TRUE	10	FALSE	FALSE	0 (NA: 0.08%)	0 (NA: 0.10%)	0 (NA: 0.37%)
15:	power	TRUE	5	FALSE	FALSE	0 (NA: 33.44%)	0 (NA: 33.62%)	0 (NA: 34.53%)
16:	typeI	TRUE	5	FALSE	FALSE	0 (NA: 0.02%)	0 (NA: 0.02%)	0 (NA: 0.13%)
17:	power	FALSE	5	TRUE	FALSE	0	0	0
18:	typeI	FALSE	5	TRUE	FALSE	0	0	0

When concluding for efficacy:

	hypo	missing	ar	binding	fixC	method 1	method 2	method 3
1:	power	TRUE	10	TRUE	FALSE	0	0	0
2:	typeI	TRUE	10	TRUE	FALSE	0	0	0
3:	power	TRUE	5	TRUE	FALSE	0	0	0
4:	typeI	TRUE	5	TRUE	FALSE	0	0	0
5:	power	TRUE	10	TRUE	TRUE	0	0	0
6:	typeI	TRUE	10	TRUE	TRUE	0	0	0
7:	power	TRUE	5	TRUE	TRUE	0	0	0
8:	typeI	TRUE	5	TRUE	TRUE	0	0	0
9:	power	TRUE	10	FALSE	TRUE	0	0	0
10:	typeI	TRUE	10	FALSE	TRUE	0	0	0
11:	power	TRUE	5	FALSE	TRUE	0	0	0
12:	typeI	TRUE	5	FALSE	TRUE	0	0	0
13:	power	TRUE	10	FALSE	FALSE	0	0	0
14:	typeI	TRUE	10	FALSE	FALSE	0	0	0
15:	power	TRUE	5	FALSE	FALSE	0	0	0
16:	typeI	TRUE	5	FALSE	FALSE	0	0	0

```
17: power   FALSE  5    TRUE FALSE        0        0        0
18: typeI   FALSE  5    TRUE FALSE        0        0        0
```

7.2.2 3 stages

When concluding for futility:

```
     hypo missing ar binding  fixC       method 1       method 2       method 3
 1: power    TRUE 10    TRUE FALSE              0              0              0
 2: typeI    TRUE 10    TRUE FALSE              0              0              0
 3: power    TRUE  5    TRUE FALSE              0              0              0
 4: typeI    TRUE  5    TRUE FALSE              0              0              0
 5: power    TRUE 10    TRUE  TRUE              0              0              0
 6: typeI    TRUE 10    TRUE  TRUE              0              0              0
 7: power    TRUE  5    TRUE  TRUE              0              0              0
 8: typeI    TRUE  5    TRUE  TRUE              0              0              0
 9: power    TRUE 10   FALSE  TRUE 0 (NA: 48.25%) 0 (NA: 45.63%) 0 (NA: 47.50%)
10: typeI    TRUE 10   FALSE  TRUE  0 (NA: 0.34%)  0 (NA: 0.31%)  0 (NA: 0.55%)
11: power    TRUE  5   FALSE  TRUE 0 (NA: 46.92%) 0 (NA: 43.72%) 0 (NA: 45.38%)
12: typeI    TRUE  5   FALSE  TRUE  0 (NA: 0.09%)  0 (NA: 0.08%)  0 (NA: 0.15%)
13: power    TRUE 10   FALSE FALSE 0 (NA: 45.00%) 0 (NA: 47.11%) 0 (NA: 47.50%)
14: typeI    TRUE 10   FALSE FALSE  0 (NA: 0.19%)  0 (NA: 0.22%)  0 (NA: 0.55%)
15: power    TRUE  5   FALSE FALSE 0 (NA: 44.89%) 0 (NA: 45.10%) 0 (NA: 45.38%)
16: typeI    TRUE  5   FALSE FALSE  0 (NA: 0.07%)  0 (NA: 0.07%)  0 (NA: 0.15%)
17: power   FALSE  5    TRUE FALSE              0              0              0
18: typeI   FALSE  5    TRUE FALSE              0              0              0
```

When concluding for efficacy:

```
     hypo missing ar binding  fixC method 1 method 2 method 3
 1: power    TRUE 10    TRUE FALSE        0        0        0
 2: typeI    TRUE 10    TRUE FALSE        0        0        0
 3: power    TRUE  5    TRUE FALSE        0        0        0
 4: typeI    TRUE  5    TRUE FALSE        0        0        0
 5: power    TRUE 10    TRUE  TRUE        0        0        0
 6: typeI    TRUE 10    TRUE  TRUE        0        0        0
 7: power    TRUE  5    TRUE  TRUE        0        0        0
 8: typeI    TRUE  5    TRUE  TRUE        0        0        0
 9: power    TRUE 10   FALSE  TRUE        0        0        0
10: typeI    TRUE 10   FALSE  TRUE        0        0        0
11: power    TRUE  5   FALSE  TRUE        0        0        0
12: typeI    TRUE  5   FALSE  TRUE        0        0        0
13: power    TRUE 10   FALSE FALSE        0        0    0.01%
14: typeI    TRUE 10   FALSE FALSE        0        0        0
```

```
15: power    TRUE  5   FALSE FALSE        0        0        0
16: typeI    TRUE  5   FALSE FALSE        0        0        0
17: power   FALSE  5    TRUE FALSE        0        0        0
18: typeI   FALSE  5    TRUE FALSE        0        0        0
```

```
[1] -1.665334537e-16
```

7.3 Range of p-values

7.3.1 2 stages

```
    missing binding  fixC ar  hypo   method 1   method 2   method 3
 1:    TRUE    TRUE FALSE 10 power [0;0.9163] [0;0.9163] [0;0.9163]
 2:    TRUE    TRUE FALSE 10 typeI      [0;1]      [0;1]      [0;1]
 3:    TRUE    TRUE FALSE  5 power [0;0.9194] [0;0.9194] [0;0.9202]
 4:    TRUE    TRUE FALSE  5 typeI      [0;1]      [0;1]      [0;1]
 5:    TRUE    TRUE  TRUE 10 power [0;0.9534] [0;0.9557] [0;0.9163]
 6:    TRUE    TRUE  TRUE 10 typeI      [0;1]      [0;1]      [0;1]
 7:    TRUE    TRUE  TRUE  5 power [0;0.9606] [0;0.9624] [0;0.9202]
 8:    TRUE    TRUE  TRUE  5 typeI  [1e-04;1]  [1e-04;1]      [0;1]
 9:    TRUE   FALSE  TRUE 10 power      [0;1]      [0;1]      [0;1]
10:    TRUE   FALSE  TRUE 10 typeI  [3e-04;1]  [4e-04;1]  [2e-04;1]
11:    TRUE   FALSE  TRUE  5 power      [0;1]      [0;1]      [0;1]
12:    TRUE   FALSE  TRUE  5 typeI  [3e-04;1]  [3e-04;1]  [1e-04;1]
13:    TRUE   FALSE FALSE 10 power      [0;1]      [0;1]      [0;1]
14:    TRUE   FALSE FALSE 10 typeI  [1e-04;1]  [1e-04;1]  [2e-04;1]
15:    TRUE   FALSE FALSE  5 power      [0;1]      [0;1]      [0;1]
16:    TRUE   FALSE FALSE  5 typeI  [1e-04;1]  [1e-04;1]  [1e-04;1]
17:   FALSE    TRUE FALSE  5 power  [0;0.867]  [0;0.867]  [0;0.882]
18:   FALSE    TRUE FALSE  5 typeI [0;0.9999] [0;0.9999]      [0;1]
```

7.3.2 3 stages

	missing	binding	fixC	ar	hypo	method 1	method 2	method 3
1:	TRUE	TRUE	FALSE	10	power	[0;0.8665]	[0;0.8663]	[0;0.9035]
2:	TRUE	TRUE	FALSE	10	typeI	[1e-04;0.9999]	[1e-04;0.9999]	[2e-04;1]
3:	TRUE	TRUE	FALSE	5	power	[0;0.8959]	[0;0.8959]	[0;0.9405]
4:	TRUE	TRUE	FALSE	5	typeI	[0;0.9998]	[0;0.9998]	[0;0.9999]
5:	TRUE	TRUE	TRUE	10	power	[0;0.935]	[0;0.9394]	[0;0.9035]
6:	TRUE	TRUE	TRUE	10	typeI	[3e-04;1]	[3e-04;1]	[2e-04;1]
7:	TRUE	TRUE	TRUE	5	power	[0;0.965]	[0;0.9659]	[0;0.9405]
8:	TRUE	TRUE	TRUE	5	typeI	[0;1]	[1e-04;1]	[0;0.9999]
9:	TRUE	FALSE	TRUE	10	power	[0;1]	[0;1]	[0;1]
10:	TRUE	FALSE	TRUE	10	typeI	[4e-04;1]	[5e-04;1]	[3e-04;1]
11:	TRUE	FALSE	TRUE	5	power	[0;1]	[0;1]	[0;1]
12:	TRUE	FALSE	TRUE	5	typeI	[3e-04;1]	[4e-04;1]	[1e-04;1]
13:	TRUE	FALSE	FALSE	10	power	[0;1]	[0;1]	[0;1]
14:	TRUE	FALSE	FALSE	10	typeI	[1e-04;1]	[1e-04;1]	[3e-04;1]
15:	TRUE	FALSE	FALSE	5	power	[0;1]	[0;1]	[0;1]
16:	TRUE	FALSE	FALSE	5	typeI	[1e-04;1]	[1e-04;1]	[1e-04;1]
17:	FALSE	TRUE	FALSE	5	power	[0;0.8745]	[0;0.8745]	[0;0.906]
18:	FALSE	TRUE	FALSE	5	typeI	[0;0.9998]	[0;0.9998]	[0;0.9999]

8 Coverage

8.1 2 stages

	hypo	missing	ar	binding	fixC	method 1	method 2	method 3
1:	power	FALSE	5	TRUE	FALSE	95.32%	95.35%	95.50%
2:	power	TRUE	5	FALSE	FALSE	96.06% (NA: 3.12%)	96.06% (NA: 3.14%)	96.26% (NA: 2.86%)
3:	power	TRUE	5	FALSE	TRUE	97.57% (NA: 3.47%)	97.56% (NA: 3.18%)	96.26% (NA: 2.86%)
4:	power	TRUE	5	TRUE	FALSE	94.68%	94.69%	94.86%
5:	power	TRUE	5	TRUE	TRUE	95.98%	95.90%	94.86%
6:	power	TRUE	10	FALSE	FALSE	96.16% (NA: 3.16%)	96.22% (NA: 3.32%)	95.96% (NA: 2.52%)
7:	power	TRUE	10	FALSE	TRUE	97.11% (NA: 3.70%)	97.07% (NA: 3.36%)	95.96% (NA: 2.52%)
8:	power	TRUE	10	TRUE	FALSE	94.76%	94.75%	95.04%
9:	power	TRUE	10	TRUE	TRUE	95.55%	95.67%	95.04%
10:	typeI	FALSE	5	TRUE	FALSE	94.96%	94.96%	94.30%
11:	typeI	TRUE	5	FALSE	FALSE	95.02% (NA: 0.02%)	95.02% (NA: 0.02%)	95.11% (NA: 0.12%)
12:	typeI	TRUE	5	FALSE	TRUE	95.09% (NA: 0.09%)	95.08% (NA: 0.09%)	95.11% (NA: 0.12%)
13:	typeI	TRUE	5	TRUE	FALSE	94.63%	94.63%	94.19%
14:	typeI	TRUE	5	TRUE	TRUE	91.68%	91.52%	94.19%
15:	typeI	TRUE	10	FALSE	FALSE	95.09% (NA: 0.08%)	95.11% (NA: 0.10%)	95.29% (NA: 0.35%)
16:	typeI	TRUE	10	FALSE	TRUE	95.23% (NA: 0.23%)	95.22% (NA: 0.23%)	95.29% (NA: 0.35%)
17:	typeI	TRUE	10	TRUE	FALSE	94.56%	94.57%	94.17%
18:	typeI	TRUE	10	TRUE	TRUE	92.67%	92.39%	94.17%

Average width of the confidence intervals

	hypo	missing	ar	binding	fixC	method 1	method 2	method 3
1:	power	FALSE	5	TRUE	FALSE	1.0532	1.0533	1.053
2:	power	TRUE	5	FALSE	FALSE	1.0453	1.0453	1.045
3:	power	TRUE	5	FALSE	TRUE	1.0520	1.0526	1.045
4:	power	TRUE	5	TRUE	FALSE	1.0520	1.0520	1.051
5:	power	TRUE	5	TRUE	TRUE	1.0586	1.0587	1.051
6:	power	TRUE	10	FALSE	FALSE	1.0559	1.0558	1.051
7:	power	TRUE	10	FALSE	TRUE	1.0638	1.0649	1.051
8:	power	TRUE	10	TRUE	FALSE	1.0627	1.0631	1.058
9:	power	TRUE	10	TRUE	TRUE	1.0708	1.0712	1.058
10:	typeI	FALSE	5	TRUE	FALSE	1.0444	1.0443	1.047
11:	typeI	TRUE	5	FALSE	FALSE	0.9995	0.9995	1.014
12:	typeI	TRUE	5	FALSE	TRUE	0.9994	0.9996	1.014
13:	typeI	TRUE	5	TRUE	FALSE	1.0431	1.0429	1.047
14:	typeI	TRUE	5	TRUE	TRUE	1.0396	1.0406	1.047
15:	typeI	TRUE	10	FALSE	FALSE	1.0009	1.0009	1.044
16:	typeI	TRUE	10	FALSE	TRUE	1.0005	1.0005	1.044
17:	typeI	TRUE	10	TRUE	FALSE	1.0469	1.0457	1.057
18:	typeI	TRUE	10	TRUE	TRUE	1.0412	1.0425	1.057

Average ratio between the length of the MUE CIs vs. the ML CIs

	hypo	missing	ar	binding	fixC	method 1	method 2	method 3
1:	power	FALSE	5	TRUE	FALSE	1.0579	1.0580	1.058
2:	power	TRUE	5	FALSE	FALSE	1.0539	1.0539	1.053
3:	power	TRUE	5	FALSE	TRUE	1.0602	1.0604	1.053
4:	power	TRUE	5	TRUE	FALSE	1.0574	1.0574	1.057
5:	power	TRUE	5	TRUE	TRUE	1.0633	1.0632	1.057
6:	power	TRUE	10	FALSE	FALSE	1.0603	1.0603	1.056
7:	power	TRUE	10	FALSE	TRUE	1.0680	1.0688	1.056
8:	power	TRUE	10	TRUE	FALSE	1.0652	1.0656	1.060
9:	power	TRUE	10	TRUE	TRUE	1.0727	1.0730	1.060
10:	typeI	FALSE	5	TRUE	FALSE	1.0506	1.0506	1.054
11:	typeI	TRUE	5	FALSE	FALSE	0.9995	0.9995	1.014
12:	typeI	TRUE	5	FALSE	TRUE	0.9996	0.9997	1.014
13:	typeI	TRUE	5	TRUE	FALSE	1.0499	1.0497	1.054
14:	typeI	TRUE	5	TRUE	TRUE	1.0467	1.0477	1.054
15:	typeI	TRUE	10	FALSE	FALSE	1.0009	1.0010	1.045
16:	typeI	TRUE	10	FALSE	TRUE	1.0008	1.0009	1.045
17:	typeI	TRUE	10	TRUE	FALSE	1.0502	1.0490	1.061
18:	typeI	TRUE	10	TRUE	TRUE	1.0448	1.0461	1.061

8.2 3 stages

	hypo	missing	ar	binding	fixC	method 1	method 2	method 3
1:	power	FALSE	5	TRUE	FALSE	94.74%	94.73% (NA: 0.02%)	95.00% (NA: 0.01%)
2:	power	TRUE	5	FALSE	FALSE	95.81% (NA: 4.35%)	95.85% (NA: 4.37%)	95.85% (NA: 3.85%)
3:	power	TRUE	5	FALSE	TRUE	97.75% (NA: 4.72%)	97.73% (NA: 4.32%)	95.86% (NA: 3.85%)
4:	power	TRUE	5	TRUE	FALSE	95.11% (NA: 0.04%)	95.14% (NA: 0.04%)	95.32% (NA: 0.03%)
5:	power	TRUE	5	TRUE	TRUE	96.03% (NA: 0.03%)	96.15% (NA: 0.03%)	95.32% (NA: 0.03%)
6:	power	TRUE	10	FALSE	FALSE	95.81% (NA: 4.23%)	95.89% (NA: 4.48%)	95.54% (NA: 3.21%)
7:	power	TRUE	10	FALSE	TRUE	97.48% (NA: 4.82%)	97.50% (NA: 4.44%)	95.52% (NA: 3.21%)
8:	power	TRUE	10	TRUE	FALSE	95.15%	95.16%	95.33%
9:	power	TRUE	10	TRUE	TRUE	95.97%	95.91%	95.33%
10:	typeI	FALSE	5	TRUE	FALSE	94.80% (NA: 0.13%)	94.80% (NA: 0.13%)	94.19% (NA: 0.15%)
11:	typeI	TRUE	5	FALSE	FALSE	94.78% (NA: 0.30%)	94.83% (NA: 0.35%)	94.71% (NA: 0.40%)
12:	typeI	TRUE	5	FALSE	TRUE	94.80% (NA: 0.32%)	94.79% (NA: 0.30%)	94.75% (NA: 0.40%)
13:	typeI	TRUE	5	TRUE	FALSE	95.05% (NA: 0.12%)	95.05% (NA: 0.12%)	94.20% (NA: 0.16%)
14:	typeI	TRUE	5	TRUE	TRUE	89.80% (NA: 0.13%)	89.53% (NA: 0.15%)	94.20% (NA: 0.15%)
15:	typeI	TRUE	10	FALSE	FALSE	94.85% (NA: 0.42%)	94.90% (NA: 0.47%)	95.13% (NA: 0.77%)
16:	typeI	TRUE	10	FALSE	TRUE	95.00% (NA: 0.57%)	95.01% (NA: 0.59%)	95.12% (NA: 0.79%)
17:	typeI	TRUE	10	TRUE	FALSE	95.02% (NA: 0.22%)	94.97% (NA: 0.14%)	94.30% (NA: 0.09%)
18:	typeI	TRUE	10	TRUE	TRUE	91.52% (NA: 0.17%)	91.12% (NA: 0.14%)	94.30% (NA: 0.11%)

Average width of the confidence intervals

	hypo	missing	ar	binding	fixC	method 1	method 2	method 3
1:	power	FALSE	5	TRUE	FALSE	1.0789	1.0790	1.077
2:	power	TRUE	5	FALSE	FALSE	1.0707	1.0707	1.069
3:	power	TRUE	5	FALSE	TRUE	1.0757	1.0757	1.069
4:	power	TRUE	5	TRUE	FALSE	1.0782	1.0783	1.077
5:	power	TRUE	5	TRUE	TRUE	1.0834	1.0830	1.077
6:	power	TRUE	10	FALSE	FALSE	1.1011	1.1012	1.096
7:	power	TRUE	10	FALSE	TRUE	1.1101	1.1110	1.096
8:	power	TRUE	10	TRUE	FALSE	1.1085	1.1087	1.104
9:	power	TRUE	10	TRUE	TRUE	1.1176	1.1176	1.104
10:	typeI	FALSE	5	TRUE	FALSE	1.0788	1.0788	1.084
11:	typeI	TRUE	5	FALSE	FALSE	0.9997	0.9997	1.018
12:	typeI	TRUE	5	FALSE	TRUE	0.9998	0.9998	1.018
13:	typeI	TRUE	5	TRUE	FALSE	1.0743	1.0742	1.079
14:	typeI	TRUE	5	TRUE	TRUE	1.0755	1.0764	1.079
15:	typeI	TRUE	10	FALSE	FALSE	0.9995	0.9995	1.061
16:	typeI	TRUE	10	FALSE	TRUE	0.9990	0.9994	1.061
17:	typeI	TRUE	10	TRUE	FALSE	1.1013	1.1005	1.114
18:	typeI	TRUE	10	TRUE	TRUE	1.0942	1.0953	1.114

Average ratio between the length of the MUE CIs vs. the ML CIs

	hypo	missing	ar	binding	fixC	method 1	method 2	method 3
1:	power	FALSE	5	TRUE	FALSE	1.0825	1.0826	1.081
2:	power	TRUE	5	FALSE	FALSE	1.0776	1.0776	1.076
3:	power	TRUE	5	FALSE	TRUE	1.0811	1.0808	1.076
4:	power	TRUE	5	TRUE	FALSE	1.0827	1.0828	1.081
5:	power	TRUE	5	TRUE	TRUE	1.0859	1.0854	1.081
6:	power	TRUE	10	FALSE	FALSE	1.1040	1.1041	1.098
7:	power	TRUE	10	FALSE	TRUE	1.1117	1.1120	1.098
8:	power	TRUE	10	TRUE	FALSE	1.1100	1.1103	1.105
9:	power	TRUE	10	TRUE	TRUE	1.1173	1.1171	1.105
10:	typeI	FALSE	5	TRUE	FALSE	1.0854	1.0854	1.091
11:	typeI	TRUE	5	FALSE	FALSE	0.9996	0.9996	1.018
12:	typeI	TRUE	5	FALSE	TRUE	0.9998	0.9997	1.018
13:	typeI	TRUE	5	TRUE	FALSE	1.0815	1.0814	1.087
14:	typeI	TRUE	5	TRUE	TRUE	1.0844	1.0851	1.087
15:	typeI	TRUE	10	FALSE	FALSE	0.9995	0.9995	1.062
16:	typeI	TRUE	10	FALSE	TRUE	0.9994	0.9996	1.062
17:	typeI	TRUE	10	TRUE	FALSE	1.1060	1.1052	1.120
18:	typeI	TRUE	10	TRUE	TRUE	1.1006	1.1013	1.120

9 Percentage of missing values (2 stages)

At the first interim

- `pc.all` percentage of observations with full data (with respect to all observations, i.e. patients with baseline measurement)
- `pc.missing3` percentage of observations missing the final outcome but with intermediate outcome value and baseline.
- `pc.missing23` percentage of observations with only baseline value

Here only for method 1 - values are very similar between different methods:

	method	missing	ar	hypo	fixC	binding	N	pc.all	pc.missing3	pc.missing23
1:	1	TRUE	5	power	FALSE	TRUE	10000	78.81	9.833	11.360
2:	1	TRUE	5	typeI	FALSE	TRUE	10000	78.81	9.833	11.360
3:	1	TRUE	5	power	TRUE	TRUE	10000	78.81	9.833	11.360
4:	1	TRUE	5	typeI	TRUE	TRUE	10000	78.81	9.833	11.360
5:	1	TRUE	5	power	TRUE	FALSE	9900	78.73	9.861	11.410
6:	1	TRUE	5	typeI	TRUE	FALSE	10000	78.73	9.860	11.410
7:	1	TRUE	5	power	FALSE	FALSE	9900	78.73	9.861	11.410
8:	1	TRUE	5	typeI	FALSE	FALSE	10000	78.73	9.860	11.410
9:	1	FALSE	5	power	FALSE	TRUE	10000	86.82	6.570	6.610
10:	1	FALSE	5	typeI	FALSE	TRUE	9900	86.82	6.570	6.609
11:	1	TRUE	10	power	FALSE	TRUE	10000	70.41	13.802	15.791
12:	1	TRUE	10	typeI	FALSE	TRUE	10000	70.41	13.802	15.791
13:	1	TRUE	10	power	TRUE	TRUE	10000	70.41	13.802	15.791
14:	1	TRUE	10	typeI	TRUE	TRUE	10000	70.41	13.802	15.791
15:	1	TRUE	10	power	TRUE	FALSE	9900	70.42	13.807	15.776
16:	1	TRUE	10	typeI	TRUE	FALSE	10000	70.42	13.806	15.776
17:	1	TRUE	10	power	FALSE	FALSE	9900	70.42	13.807	15.776
18:	1	TRUE	10	typeI	FALSE	FALSE	10000	70.42	13.806	15.776

10 Information

10.1 2 stages

Percentage of information for method 1[5]:

scenario	missing	binding	fixC	ar	interim	decision	final
1	TRUE	TRUE	FALSE	10	54.92	77.30	103.07
2	TRUE	TRUE	FALSE	10	54.92	77.05	102.89
3	TRUE	TRUE	FALSE	5	53.43	64.89	103.08
4	TRUE	TRUE	FALSE	5	53.43	64.61	102.94
5	TRUE	TRUE	TRUE	10	54.92	77.30	103.07
6	TRUE	TRUE	TRUE	10	54.92	77.05	102.89
7	TRUE	TRUE	TRUE	5	53.43	64.89	103.08
8	TRUE	TRUE	TRUE	5	53.43	64.61	102.94
9	TRUE	FALSE	TRUE	10	54.72	76.74	102.63
10	TRUE	FALSE	TRUE	10	54.71	76.11	103.18
11	TRUE	FALSE	TRUE	5	53.25	64.47	102.68
12	TRUE	FALSE	TRUE	5	53.25	64.35	103.18
13	TRUE	FALSE	FALSE	10	54.72	76.74	102.63
14	TRUE	FALSE	FALSE	10	54.71	76.11	103.18
15	TRUE	FALSE	FALSE	5	53.25	64.47	102.68
16	TRUE	FALSE	FALSE	5	53.25	64.35	103.18
17	FALSE	TRUE	FALSE	5	52.13	64.38	100.18
18	FALSE	TRUE	FALSE	5	52.12	64.19	99.81

Similar results for other methods.

10.2 3 stages

Percentage of information for method 1[6]:

scenario	missing	binding	fixC	ar	interim1	decision1	interim2	decision2	final3
1	TRUE	TRUE	FALSE	10	39.08	61.13	64.87	86.70	102.65
2	TRUE	TRUE	FALSE	10	39.08	61.04	64.66	86.27	102.16
3	TRUE	TRUE	FALSE	5	37.69	48.99	63.40	74.47	102.73
4	TRUE	TRUE	FALSE	5	37.69	48.93	63.17	74.09	102.19
5	TRUE	TRUE	TRUE	10	39.08	61.13	64.87	86.70	102.65
6	TRUE	TRUE	TRUE	10	39.08	61.04	64.66	86.27	102.16
7	TRUE	TRUE	TRUE	5	37.69	48.99	63.40	74.47	102.73
8	TRUE	TRUE	TRUE	5	37.69	48.93	63.17	74.09	102.19
9	TRUE	FALSE	TRUE	10	38.85	60.43	64.52	85.88	102.34
10	TRUE	FALSE	TRUE	10	38.85	61.18	64.76	90.06	102.97

[5] average over the reached stages
[6] average over the reached stages

11	TRUE	FALSE	TRUE	5	37.47	48.55	63.08	73.93	102.43
12	TRUE	FALSE	TRUE	5	37.47	49.96	63.30	75.12	103.00
13	TRUE	FALSE	FALSE	10	38.85	60.43	64.52	85.88	102.34
14	TRUE	FALSE	FALSE	10	38.85	61.18	64.76	90.06	102.97
15	TRUE	FALSE	FALSE	5	37.47	48.55	63.08	73.93	102.43
16	TRUE	FALSE	FALSE	5	37.47	49.96	63.30	75.12	103.00
17	FALSE	TRUE	FALSE	5	36.89	49.06	61.81	73.70	99.93
18	FALSE	TRUE	FALSE	5	36.89	48.91	61.69	73.42	99.67