Results simulation study DelayedGSD

October 19, 2023

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	81.00%	80.93%	80.43%
3	10000	TRUE	TRUE	FALSE	5	80.53%	80.53%	80.14%
5	10000	TRUE	TRUE	TRUE	10	80.15%	80.35%	80.43%
7	10000	TRUE	TRUE	TRUE	5	80.08%	80.20%	80.14%
9	10000	TRUE	FALSE	TRUE	10	79.86%	80.12%	80.26%
11	10000	TRUE	FALSE	TRUE	5	79.93%	80.04%	80.06%
13	10000	TRUE	FALSE	FALSE	10	80.50%	80.44%	80.26%
15	10000	TRUE	FALSE	FALSE	5	80.37%	80.36%	80.06%
17	10000	FALSE	TRUE	FALSE	5	80.31%	80.30%	79.92%

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	2.42%	2.39%	2.37%
4	10000	TRUE	TRUE	FALSE	5	2.40%	2.40%	2.35%
6	10000	TRUE	TRUE	TRUE	10	2.24%	2.22%	2.37%
8	10000	TRUE	TRUE	TRUE	5	2.32%	2.31%	2.35%
10	10000	TRUE	FALSE	TRUE	10	2.45%	2.47%	2.57%
12	10000	TRUE	FALSE	TRUE	5	2.63%	2.64%	2.66%
14	10000	TRUE	FALSE	FALSE	10	2.53%	2.53%	2.57%
16	10000	TRUE	FALSE	FALSE	5	2.68%	2.68%	2.66%
18	10000	FALSE	TRUE	FALSE	5	2.46%	2.46%	2.45%

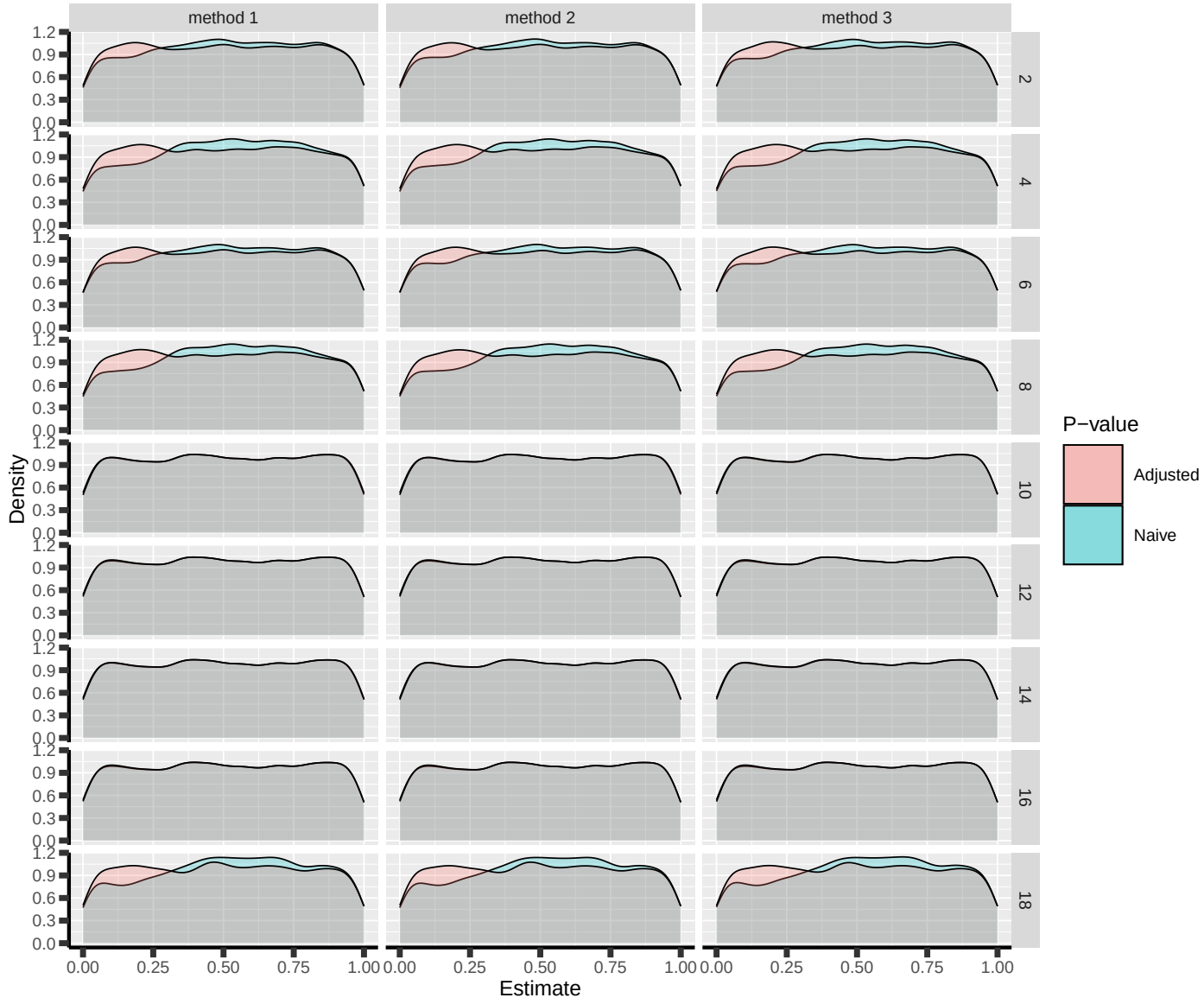

Figure 1: Naive and adjusted p-value distribution over all simulations under the null. Each row correspond to a different scenario

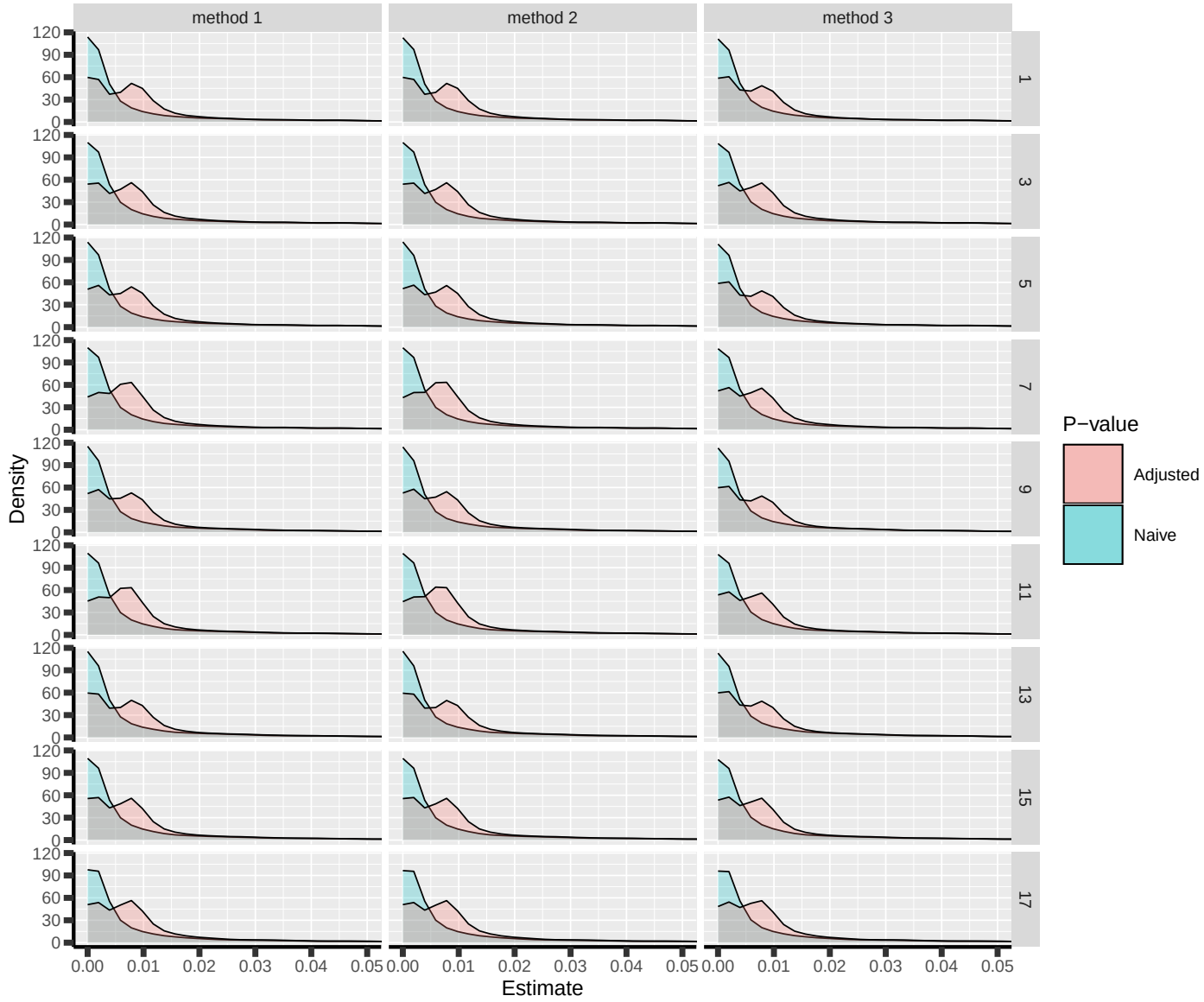

Figure 2: Naive and adjusted p-value distribution over all simulations under the alternative. Each row correspond to a different scenario

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	74.51%	74.51%	74.01%
3	10000	TRUE	TRUE	FALSE	5	74.35%	74.35%	73.99%
5	10000	TRUE	TRUE	TRUE	10	73.84%	73.91%	74.01%
7	10000	TRUE	TRUE	TRUE	5	74.00%	74.01%	73.99%
9	10000	TRUE	FALSE	TRUE	10	74.17%	74.25%	74.45%
11	10000	TRUE	FALSE	TRUE	5	74.33%	74.37%	74.43%
13	10000	TRUE	FALSE	FALSE	10	74.71%	74.71%	74.45%
15	10000	TRUE	FALSE	FALSE	5	74.61%	74.59%	74.43%
17	10000	FALSE	TRUE	FALSE	5	72.18%	72.18%	71.97%

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	2.60%	2.60%	2.49%
4	10000	TRUE	TRUE	FALSE	5	2.61%	2.61%	2.59%
6	10000	TRUE	TRUE	TRUE	10	2.47%	2.50%	2.49%
8	10000	TRUE	TRUE	TRUE	5	2.56%	2.55%	2.59%
10	9990	TRUE	FALSE	TRUE	10	2.37%	2.37%	2.42%
12	10000	TRUE	FALSE	TRUE	5	2.43%	2.44%	2.44%
14	9990	TRUE	FALSE	FALSE	10	2.49%	2.49%	2.42%
16	10000	TRUE	FALSE	FALSE	5	2.53%	2.53%	2.44%
18	10000	FALSE	TRUE	FALSE	5	2.61%	2.61%	2.54%

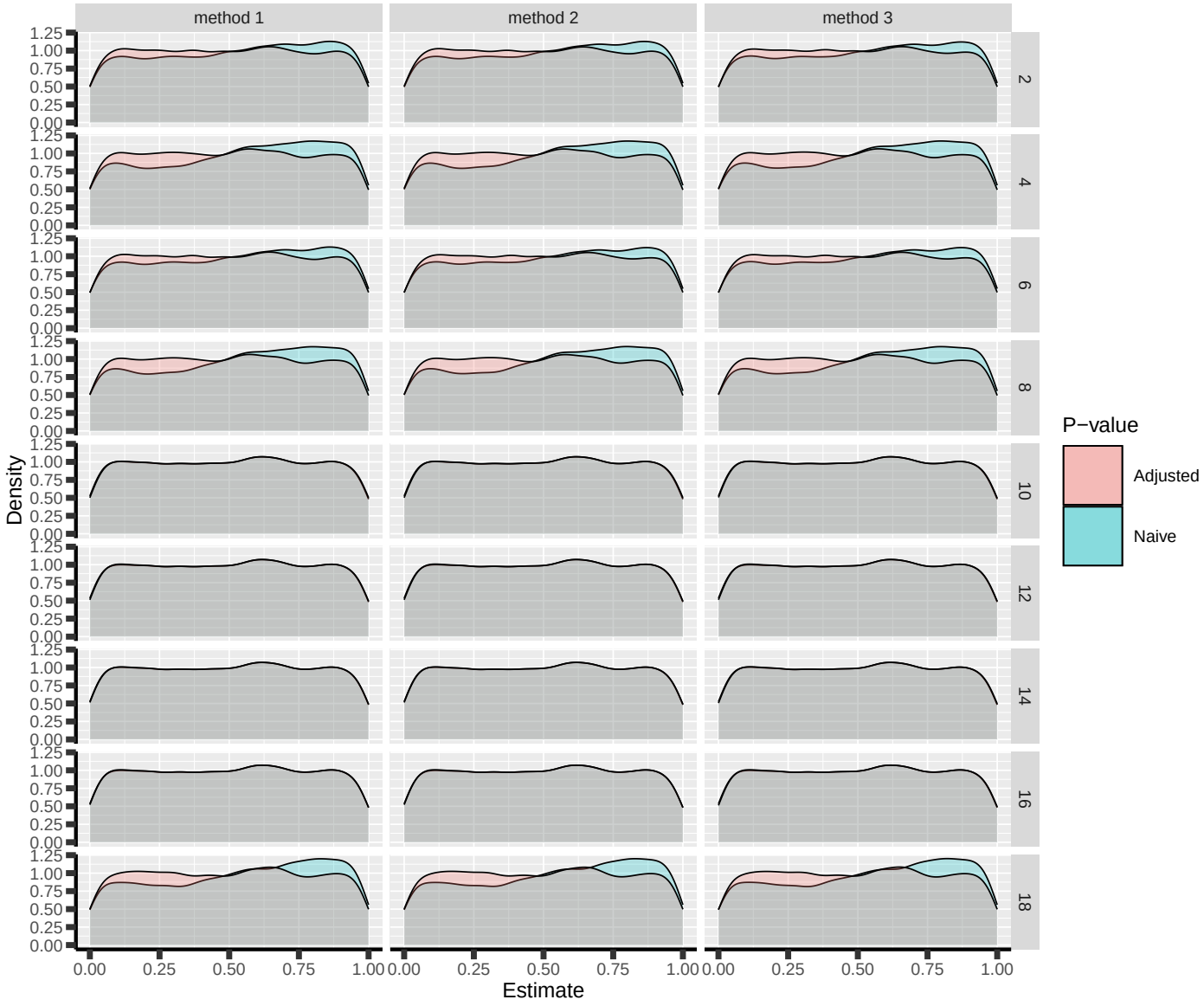

Figure 3: Naive and adjusted p-value distribution over all simulations under the null. Each row correspond to a different scenario

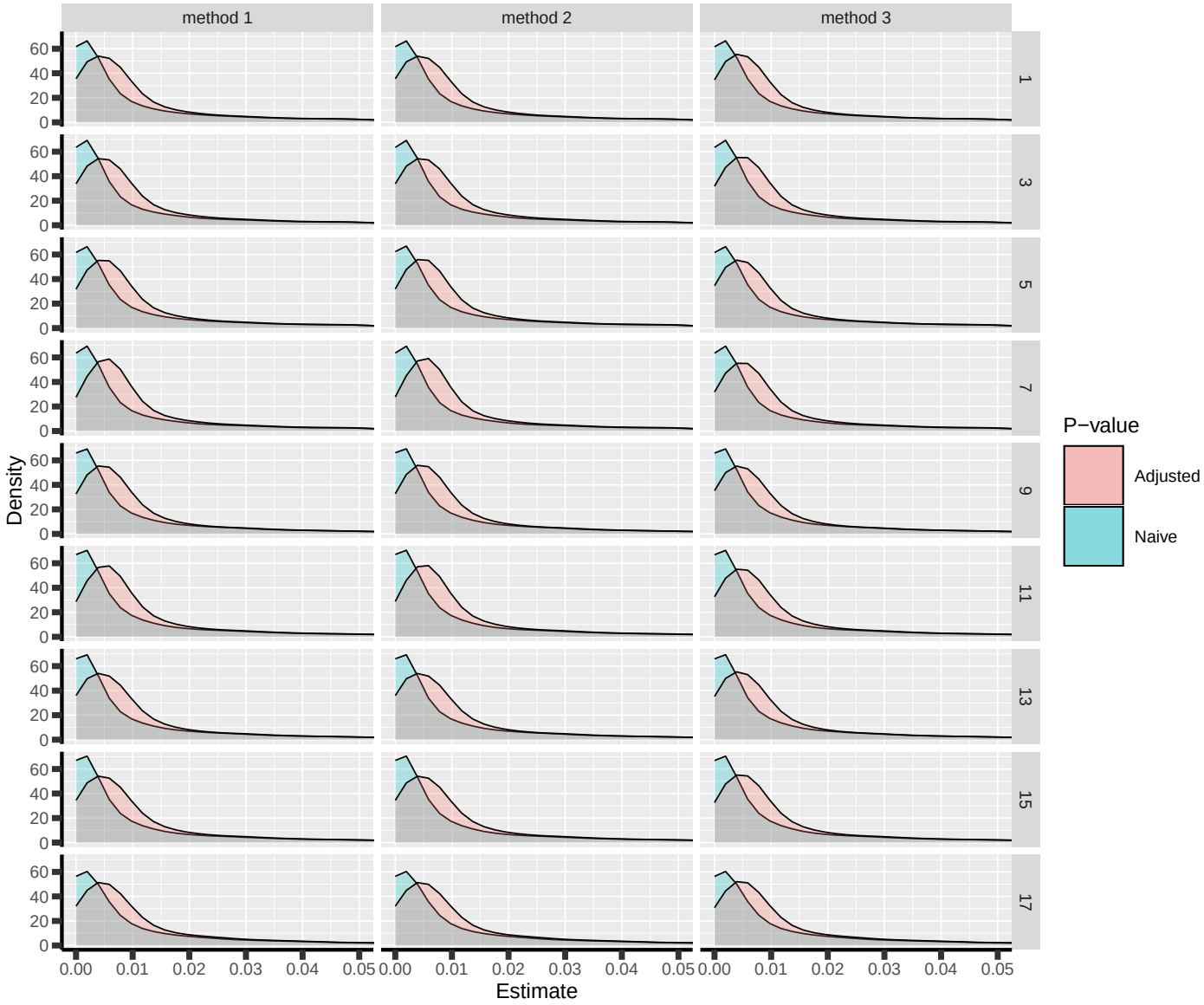

Figure 4: Naive and adjusted p-value distribution over all simulations under the alternative. Each row correspond to a different scenario

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	37.79%	5.93%	43.21%	13.07%
2:	10000	TRUE	typeI	TRUE	FALSE	10	0.80%	71.13%	1.62%	26.45%
3:	10000	TRUE	power	TRUE	FALSE	5	35.74%	5.98%	44.79%	13.49%
4:	10000	TRUE	typeI	TRUE	FALSE	5	0.74%	69.32%	1.66%	28.28%
5:	10000	TRUE	power	TRUE	TRUE	10	36.94%	6.78%	43.21%	13.07%
6:	10000	TRUE	typeI	TRUE	TRUE	10	0.62%	71.31%	1.62%	26.45%
7:	10000	TRUE	power	TRUE	TRUE	5	35.29%	6.43%	44.79%	13.49%
8:	10000	TRUE	typeI	TRUE	TRUE	5	0.66%	69.40%	1.66%	28.28%
9:	10000	TRUE	power	FALSE	TRUE	10	38.05%	6.57%	41.81%	13.57%
10:	10000	TRUE	typeI	FALSE	TRUE	10	0.61%	0.20%	1.84%	97.35%
11:	10000	TRUE	power	FALSE	TRUE	5	36.35%	6.15%	43.58%	13.92%
12:	10000	TRUE	typeI	FALSE	TRUE	5	0.70%	0.06%	1.93%	97.31%
13:	10000	TRUE	power	FALSE	FALSE	10	38.69%	5.93%	41.81%	13.57%
14:	10000	TRUE	typeI	FALSE	FALSE	10	0.69%	0.12%	1.84%	97.35%
15:	10000	TRUE	power	FALSE	FALSE	5	36.79%	5.71%	43.58%	13.92%
16:	10000	TRUE	typeI	FALSE	FALSE	5	0.75%	0.01%	1.93%	97.31%
17:	10000	FALSE	power	TRUE	FALSE	5	33.98%	5.33%	46.33%	14.36%
18:	10000	FALSE	typeI	TRUE	FALSE	5	0.74%	67.48%	1.72%	30.06%

Method 2:

	N	missing	hypo	binding	fixC	ar	decision.eff	decision.fut	final.eff	final.fut
1:	10000	TRUE	power	TRUE	FALSE	10	37.85%	6.19%	43.08%	12.88%
2:	10000	TRUE	typeI	TRUE	FALSE	10	0.79%	71.64%	1.60%	25.97%
3:	10000	TRUE	power	TRUE	FALSE	5	35.77%	5.99%	44.76%	13.48%
4:	10000	TRUE	typeI	TRUE	FALSE	5	0.74%	69.38%	1.66%	28.22%
5:	10000	TRUE	power	TRUE	TRUE	10	36.69%	6.24%	43.66%	13.41%
6:	10000	TRUE	typeI	TRUE	TRUE	10	0.59%	69.61%	1.63%	28.17%
7:	10000	TRUE	power	TRUE	TRUE	5	35.02%	6.05%	45.18%	13.75%
8:	10000	TRUE	typeI	TRUE	TRUE	5	0.63%	68.36%	1.68%	29.33%
9:	10000	TRUE	power	FALSE	TRUE	10	37.85%	6.04%	42.27%	13.84%
10:	10000	TRUE	typeI	FALSE	TRUE	10	0.61%	0.19%	1.86%	97.34%
11:	10000	TRUE	power	FALSE	TRUE	5	36.18%	5.84%	43.86%	14.12%
12:	10000	TRUE	typeI	FALSE	TRUE	5	0.69%	0.06%	1.95%	97.30%
13:	10000	TRUE	power	FALSE	FALSE	10	38.70%	6.09%	41.74%	13.47%
14:	10000	TRUE	typeI	FALSE	FALSE	10	0.69%	0.12%	1.84%	97.35%
15:	10000	TRUE	power	FALSE	FALSE	5	36.82%	5.75%	43.54%	13.89%
16:	10000	TRUE	typeI	FALSE	FALSE	5	0.75%	0.01%	1.93%	97.31%
17:	10000	FALSE	power	TRUE	FALSE	5	34.03%	5.36%	46.27%	14.34%
18:	10000	FALSE	typeI	TRUE	FALSE	5	0.74%	67.55%	1.72%	29.99%

Method 3:

	N	missing	hypo	binding	fixC	ar	decision.eff	decision.fut	final.eff	final.fut
1:	10000	TRUE	power	TRUE	FALSE	10	40.58%	6.53%	39.85%	13.04%
2:	10000	TRUE	typeI	TRUE	FALSE	10	0.74%	68.79%	1.63%	28.84%
3:	10000	TRUE	power	TRUE	FALSE	5	36.54%	6.30%	43.60%	13.56%
4:	10000	TRUE	typeI	TRUE	FALSE	5	0.69%	68.41%	1.66%	29.24%
5:	10000	TRUE	power	TRUE	TRUE	10	40.58%	6.53%	39.85%	13.04%
6:	10000	TRUE	typeI	TRUE	TRUE	10	0.74%	68.79%	1.63%	28.84%
7:	10000	TRUE	power	TRUE	TRUE	5	36.54%	6.30%	43.60%	13.56%
8:	10000	TRUE	typeI	TRUE	TRUE	5	0.69%	68.41%	1.66%	29.24%
9:	10000	TRUE	power	FALSE	TRUE	10	41.34%	6.20%	38.92%	13.54%
10:	10000	TRUE	typeI	FALSE	TRUE	10	0.77%	0.33%	1.80%	97.10%
11:	10000	TRUE	power	FALSE	TRUE	5	37.71%	6.03%	42.35%	13.91%
12:	10000	TRUE	typeI	FALSE	TRUE	5	0.73%	0.09%	1.93%	97.25%
13:	10000	TRUE	power	FALSE	FALSE	10	41.34%	6.20%	38.92%	13.54%
14:	10000	TRUE	typeI	FALSE	FALSE	10	0.77%	0.33%	1.80%	97.10%
15:	10000	TRUE	power	FALSE	FALSE	5	37.71%	6.03%	42.35%	13.91%
16:	10000	TRUE	typeI	FALSE	FALSE	5	0.73%	0.09%	1.93%	97.25%
17:	10000	FALSE	power	TRUE	FALSE	5	34.65%	5.59%	45.27%	14.49%
18:	10000	FALSE	typeI	TRUE	FALSE	5	0.68%	66.54%	1.77%	31.01%

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	81.00%	0.85%
2:	1	TRUE	2	TRUE	FALSE	10	power	10000	80.93%	0.84%
3:	2	TRUE	1	TRUE	FALSE	10	typeI	10000	2.42%	0.18%
4:	2	TRUE	2	TRUE	FALSE	10	typeI	10000	2.39%	0.17%
5:	3	TRUE	1	TRUE	FALSE	5	power	10000	80.53%	0.45%
6:	3	TRUE	2	TRUE	FALSE	5	power	10000	80.53%	0.45%
7:	4	TRUE	1	TRUE	FALSE	5	typeI	10000	2.40%	0.08%
8:	4	TRUE	2	TRUE	FALSE	5	typeI	10000	2.40%	0.08%
9:	13	TRUE	1	FALSE	FALSE	10	power	10000	80.50%	0.64%
10:	13	TRUE	2	FALSE	FALSE	10	power	10000	80.44%	0.64%
11:	14	TRUE	1	FALSE	FALSE	10	typeI	10000	2.53%	0.08%
12:	14	TRUE	2	FALSE	FALSE	10	typeI	10000	2.53%	0.08%
13:	15	TRUE	1	FALSE	FALSE	5	power	10000	80.37%	0.44%
14:	15	TRUE	2	FALSE	FALSE	5	power	10000	80.36%	0.44%
15:	16	TRUE	1	FALSE	FALSE	5	typeI	10000	2.68%	0.05%
16:	16	TRUE	2	FALSE	FALSE	5	typeI	10000	2.68%	0.05%
17:	17	FALSE	1	TRUE	FALSE	5	power	10000	80.31%	0.42%
18:	17	FALSE	2	TRUE	FALSE	5	power	10000	80.30%	0.43%
19:	18	FALSE	1	TRUE	FALSE	5	typeI	10000	2.46%	0.08%
20:	18	FALSE	2	TRUE	FALSE	5	typeI	10000	2.46%	0.08%

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	9.46%	1.46%	20.92%	3.30%	44.13%	20.73%
2:	10000		TRUE	typeI	TRUE	FALSE	10	0.23%	26.36%	0.48%	35.88%	1.89%	35.16%
3:	10000		TRUE	power	TRUE	FALSE	5	9.90%	1.65%	20.79%	3.54%	43.66%	20.46%
4:	10000		TRUE	typeI	TRUE	FALSE	5	0.27%	27.41%	0.39%	35.44%	1.95%	34.54%
5:	10000		TRUE	power	TRUE	TRUE	10	9.27%	1.65%	20.44%	3.78%	44.13%	20.73%
6:	10000		TRUE	typeI	TRUE	TRUE	10	0.17%	26.42%	0.41%	35.95%	1.89%	35.16%
7:	10000		TRUE	power	TRUE	TRUE	5	9.75%	1.80%	20.59%	3.74%	43.66%	20.46%
8:	10000		TRUE	typeI	TRUE	TRUE	5	0.25%	27.43%	0.36%	35.47%	1.95%	34.54%
9:	10000		TRUE	power	FALSE	TRUE	10	9.60%	1.62%	20.44%	3.60%	44.13%	20.61%
10:	9990		TRUE	typeI	FALSE	TRUE	10	0.16%	0.07%	0.34%	0.11%	1.87%	97.45%
11:	10000		TRUE	power	FALSE	TRUE	5	10.34%	1.78%	20.48%	3.35%	43.51%	20.54%
12:	10000		TRUE	typeI	FALSE	TRUE	5	0.27%	0.02%	0.36%	0.08%	1.80%	97.47%
13:	10000		TRUE	power	FALSE	FALSE	10	9.83%	1.39%	20.75%	3.29%	44.13%	20.61%
14:	9990		TRUE	typeI	FALSE	FALSE	10	0.21%	0.02%	0.41%	0.04%	1.87%	97.45%
15:	10000		TRUE	power	FALSE	FALSE	5	10.46%	1.66%	20.64%	3.19%	43.51%	20.54%
16:	10000		TRUE	typeI	FALSE	FALSE	5	0.29%	0	0.44%	0	1.80%	97.47%
17:	10000		FALSE	power	TRUE	FALSE	5	8.93%	1.66%	19.60%	2.97%	43.65%	23.19%
18:	10000		FALSE	typeI	TRUE	FALSE	5	0.23%	25.91%	0.38%	34.48%	2.00%	37.00%

- 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	9.49%	1.47%	20.92%	3.32%	44.10%	20.70%
2:	10000		TRUE	typeI	TRUE	FALSE	10	0.23%	26.43%	0.48%	35.92%	1.89%	35.05%
3:	10000		TRUE	power	TRUE	FALSE	5	9.91%	1.65%	20.81%	3.55%	43.63%	20.45%
4:	10000		TRUE	typeI	TRUE	FALSE	5	0.27%	27.42%	0.39%	35.46%	1.95%	34.51%
5:	10000		TRUE	power	TRUE	TRUE	10	9.14%	1.51%	20.35%	3.43%	44.42%	21.15%
6:	10000		TRUE	typeI	TRUE	TRUE	10	0.17%	25.29%	0.41%	35.73%	1.92%	36.48%
7:	10000		TRUE	power	TRUE	TRUE	5	9.67%	1.74%	20.46%	3.64%	43.88%	20.61%
8:	10000		TRUE	typeI	TRUE	TRUE	5	0.24%	26.94%	0.35%	35.19%	1.96%	35.32%
9:	10000		TRUE	power	FALSE	TRUE	10	9.56%	1.46%	20.30%	3.39%	44.39%	20.90%
10:	9990		TRUE	typeI	FALSE	TRUE	10	0.16%	0.07%	0.34%	0.11%	1.87%	97.45%
11:	10000		TRUE	power	FALSE	TRUE	5	10.27%	1.74%	20.29%	3.26%	43.81%	20.63%
12:	10000		TRUE	typeI	FALSE	TRUE	5	0.27%	0.02%	0.36%	0.07%	1.81%	97.47%
13:	10000		TRUE	power	FALSE	FALSE	10	9.84%	1.40%	20.75%	3.29%	44.12%	20.60%
14:	9990		TRUE	typeI	FALSE	FALSE	10	0.21%	0.02%	0.41%	0.04%	1.87%	97.45%
15:	10000		TRUE	power	FALSE	FALSE	5	10.47%	1.67%	20.64%	3.19%	43.48%	20.55%

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16: 10000    TRUE typeI   FALSE FALSE  5    0.29%        0    0.45%        0    1.79%   97.47%
17: 10000   FALSE power    TRUE FALSE  5    8.93%    1.66%   19.62%    2.98%   43.63%   23.18%
18: 10000   FALSE typeI    TRUE FALSE  5    0.23%   25.96%    0.38%   34.49%    2.00%   36.94%
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- 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	9.90%	1.60%	21.38%	3.57%	42.73%	20.82%
2:	10000	TRUE	typeI	TRUE	FALSE	10	0.18%	25.24%	0.42%	35.72%	1.89%	36.55%
3:	10000	TRUE	power	TRUE	FALSE	5	9.85%	1.79%	20.78%	3.71%	43.36%	20.51%
4:	10000	TRUE	typeI	TRUE	FALSE	5	0.25%	27.11%	0.38%	35.31%	1.96%	34.99%
5:	10000	TRUE	power	TRUE	TRUE	10	9.90%	1.60%	21.38%	3.57%	42.73%	20.82%
6:	10000	TRUE	typeI	TRUE	TRUE	10	0.18%	25.24%	0.42%	35.72%	1.89%	36.55%
7:	10000	TRUE	power	TRUE	TRUE	5	9.85%	1.79%	20.78%	3.71%	43.36%	20.51%
8:	10000	TRUE	typeI	TRUE	TRUE	5	0.25%	27.11%	0.38%	35.31%	1.96%	34.99%
9:	10000	TRUE	power	FALSE	TRUE	10	10.35%	1.54%	21.20%	3.42%	42.90%	20.59%
10:	9990	TRUE	typeI	FALSE	TRUE	10	0.17%	0.10%	0.38%	0.12%	1.87%	97.36%
11:	10000	TRUE	power	FALSE	TRUE	5	10.60%	1.77%	20.68%	3.32%	43.15%	20.48%
12:	10000	TRUE	typeI	FALSE	TRUE	5	0.27%	0.03%	0.39%	0.08%	1.78%	97.45%
13:	10000	TRUE	power	FALSE	FALSE	10	10.35%	1.54%	21.20%	3.42%	42.90%	20.59%
14:	9990	TRUE	typeI	FALSE	FALSE	10	0.17%	0.10%	0.38%	0.12%	1.87%	97.36%
15:	10000	TRUE	power	FALSE	FALSE	5	10.60%	1.77%	20.68%	3.32%	43.15%	20.48%
16:	10000	TRUE	typeI	FALSE	FALSE	5	0.27%	0.03%	0.39%	0.08%	1.78%	97.45%
17:	10000	FALSE	power	TRUE	FALSE	5	8.94%	1.77%	19.69%	3.03%	43.34%	23.23%
18:	10000	FALSE	typeI	TRUE	FALSE	5	0.21%	25.61%	0.33%	34.46%	2.00%	37.39%

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	74.51%	0.67%
2:	1	TRUE	2	TRUE	FALSE	10	power	10000	74.51%	0.67%
3:	2	TRUE	1	TRUE	FALSE	10	typeI	10000	2.60%	0.13%
4:	2	TRUE	2	TRUE	FALSE	10	typeI	10000	2.60%	0.13%
5:	3	TRUE	1	TRUE	FALSE	5	power	10000	74.35%	0.35%
6:	3	TRUE	2	TRUE	FALSE	5	power	10000	74.35%	0.35%
7:	4	TRUE	1	TRUE	FALSE	5	typeI	10000	2.61%	0.05%
8:	4	TRUE	2	TRUE	FALSE	5	typeI	10000	2.61%	0.05%
9:	13	TRUE	1	FALSE	FALSE	10	power	10000	74.71%	0.54%
10:	13	TRUE	2	FALSE	FALSE	10	power	10000	74.71%	0.54%
11:	14	TRUE	1	FALSE	FALSE	10	typeI	9990	2.49%	0.12%
12:	14	TRUE	2	FALSE	FALSE	10	typeI	9990	2.49%	0.12%
13:	15	TRUE	1	FALSE	FALSE	5	power	10000	74.61%	0.28%
14:	15	TRUE	2	FALSE	FALSE	5	power	10000	74.59%	0.28%
15:	16	TRUE	1	FALSE	FALSE	5	typeI	10000	2.53%	0.10%
16:	16	TRUE	2	FALSE	FALSE	5	typeI	10000	2.53%	0.10%
17:	17	FALSE	1	TRUE	FALSE	5	power	10000	72.18%	0.29%
18:	17	FALSE	2	TRUE	FALSE	5	power	10000	72.18%	0.29%
19:	18	FALSE	1	TRUE	FALSE	5	typeI	10000	2.61%	0.08%
20:	18	FALSE	2	TRUE	FALSE	5	typeI	10000	2.61%	0.08%

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	0.01345	0.01315	0.01468	0.00598	0.00566	-0.00286
2:	typeI	TRUE	TRUE	FALSE	10	-0.01794	-0.01784	-0.01856	-0.00453	-0.00448	-0.00513
3:	power	TRUE	TRUE	FALSE	5	0.02257	0.02255	0.02358	0.01044	0.01047	0.00364
4:	typeI	TRUE	TRUE	FALSE	5	-0.03034	-0.03031	-0.03065	-0.01186	-0.01182	-0.01244
5:	power	TRUE	TRUE	TRUE	10	0.01345	0.01403	0.01468	-0.01482	-0.01515	-0.00286
6:	typeI	TRUE	TRUE	TRUE	10	-0.01794	-0.01871	-0.01856	-0.00553	-0.00619	-0.00513
7:	power	TRUE	TRUE	TRUE	5	0.02257	0.02309	0.02358	-0.01511	-0.01521	0.00364
8:	typeI	TRUE	TRUE	TRUE	5	-0.03034	-0.03085	-0.03065	-0.01249	-0.01307	-0.01244
9:	power	TRUE	FALSE	TRUE	10	0.01433	0.01490	0.01529	0.01725	0.01500	0.02897
10:	typeI	TRUE	FALSE	TRUE	10	0.00019	0.00019	0.00051	-0.00087	-0.00079	0.00073
11:	power	TRUE	FALSE	TRUE	5	0.02366	0.02402	0.02438	0.01667	0.01524	0.03653
12:	typeI	TRUE	FALSE	TRUE	5	0.00091	0.00085	0.00101	0.00033	0.00027	0.00086
13:	power	TRUE	FALSE	FALSE	10	0.01433	0.01416	0.01529	0.03552	0.03589	0.02897
14:	typeI	TRUE	FALSE	FALSE	10	0.00019	0.00019	0.00051	-0.00020	-0.00021	0.00073
15:	power	TRUE	FALSE	FALSE	5	0.02366	0.02365	0.02438	0.04186	0.04202	0.03653
16:	typeI	TRUE	FALSE	FALSE	5	0.00091	0.00091	0.00101	0.00087	0.00087	0.00086
17:	power	FALSE	TRUE	FALSE	5	0.02284	0.02277	0.02381	0.01197	0.01196	0.00412
18:	typeI	FALSE	TRUE	FALSE	5	-0.02952	-0.02945	-0.02992	-0.01111	-0.01106	-0.01172

Median bias [2] per estimator and method:

	hypo	missing	binding	fixC	ar	mbiasMLE1	mbiasMLE2	mbiasMLE3	mbiasMUE1	mbiasMUE2	mbiasMUE3
1:	power	TRUE	TRUE	FALSE	10	0.0261	0.0260	0.0301	-0.00240	-0.00250	-0.00545
2:	typeI	TRUE	TRUE	FALSE	10	-0.0173	-0.0170	-0.0202	0.00100	0.00075	-0.00015
3:	power	TRUE	TRUE	FALSE	5	0.0405	0.0405	0.0432	-0.00345	-0.00335	-0.00545
4:	typeI	TRUE	TRUE	FALSE	5	-0.0330	-0.0329	-0.0345	0.00055	0.00055	0.00065
5:	power	TRUE	TRUE	TRUE	10	0.0261	0.0265	0.0301	-0.01110	-0.01050	-0.00545
6:	typeI	TRUE	TRUE	TRUE	10	-0.0173	-0.0197	-0.0202	0.00100	-0.00065	-0.00015
7:	power	TRUE	TRUE	TRUE	5	0.0405	0.0407	0.0432	-0.00865	-0.00755	-0.00545
8:	typeI	TRUE	TRUE	TRUE	5	-0.0330	-0.0346	-0.0345	0.00055	0.00075	0.00065
9:	power	TRUE	FALSE	TRUE	10	0.0326	0.0332	0.0327	0.02719	0.02475	0.02804
10:	typeI	TRUE	FALSE	TRUE	10	-0.0009	-0.0009	-0.0009	-0.00190	-0.00185	-0.00025
11:	power	TRUE	FALSE	TRUE	5	0.0462	0.0459	0.0489	0.02568	0.02469	0.02799
12:	typeI	TRUE	FALSE	TRUE	5	-0.0009	-0.0010	-0.0009	-0.00130	-0.00140	-0.00015
13:	power	TRUE	FALSE	FALSE	10	0.0326	0.0324	0.0327	0.03094	0.03184	0.02804
14:	typeI	TRUE	FALSE	FALSE	10	-0.0009	-0.0009	-0.0009	-0.00150	-0.00140	-0.00025
15:	power	TRUE	FALSE	FALSE	5	0.0462	0.0464	0.0489	0.02832	0.02865	0.02799

[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   -0.0009   -0.0009   -0.0009  -0.00105  -0.00105  -0.00015
17: power   FALSE    TRUE FALSE  5    0.0383    0.0383    0.0400  -0.00265  -0.00255  -0.00485
18: typeI   FALSE    TRUE FALSE  5   -0.0329   -0.0327   -0.0353   0.00420   0.00420   0.00330
```

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	0.0212	0.0212	0.0228	0.0233	0.0233	0.0136
2:	typeI	TRUE	TRUE	FALSE	10	-0.0348	-0.0348	-0.0340	-0.0268	-0.0268	-0.0280
3:	power	TRUE	TRUE	FALSE	5	0.0344	0.0344	0.0350	0.0258	0.0258	0.0164
4:	typeI	TRUE	TRUE	FALSE	5	-0.0563	-0.0562	-0.0560	-0.0336	-0.0335	-0.0339
5:	power	TRUE	TRUE	TRUE	10	0.0212	0.0214	0.0228	0.0077	0.0080	0.0136
6:	typeI	TRUE	TRUE	TRUE	10	-0.0348	-0.0340	-0.0340	-0.0280	-0.0283	-0.0280
7:	power	TRUE	TRUE	TRUE	5	0.0344	0.0345	0.0350	0.0053	0.0056	0.0164
8:	typeI	TRUE	TRUE	TRUE	5	-0.0563	-0.0562	-0.0560	-0.0341	-0.0344	-0.0339
9:	power	TRUE	FALSE	TRUE	10	0.0209	0.0212	0.0224	0.0375	0.0359	0.0422
10:	typeI	TRUE	FALSE	TRUE	10	0.0027	0.0027	0.0028	0.0023	0.0023	0.0029
11:	power	TRUE	FALSE	TRUE	5	0.0339	0.0340	0.0347	0.0376	0.0369	0.0494
12:	typeI	TRUE	FALSE	TRUE	5	0.0037	0.0037	0.0038	0.0034	0.0035	0.0037
13:	power	TRUE	FALSE	FALSE	10	0.0209	0.0209	0.0224	0.0505	0.0505	0.0422
14:	typeI	TRUE	FALSE	FALSE	10	0.0027	0.0027	0.0028	0.0031	0.0031	0.0029
15:	power	TRUE	FALSE	FALSE	5	0.0339	0.0339	0.0347	0.0572	0.0572	0.0494
16:	typeI	TRUE	FALSE	FALSE	5	0.0037	0.0038	0.0038	0.0044	0.0044	0.0037
17:	power	FALSE	TRUE	FALSE	5	0.0303	0.0303	0.0310	0.0235	0.0235	0.0149
18:	typeI	FALSE	TRUE	FALSE	5	-0.0565	-0.0565	-0.0564	-0.0362	-0.0363	-0.0368

Median bias [4] per estimator and method:

	hypo	missing	binding	fixC	ar	mbiasMLE1	mbiasMLE2	mbiasMLE3	mbiasMUE1	mbiasMUE2	mbiasMUE3
1:	power	TRUE	TRUE	FALSE	10	0.0281	0.0281	0.0300	0.0072	0.00700	0.0025
2:	typeI	TRUE	TRUE	FALSE	10	-0.0389	-0.0388	-0.0376	-0.0001	0.00020	0.0013
3:	power	TRUE	TRUE	FALSE	5	0.0391	0.0390	0.0400	0.0081	0.00800	0.0053
4:	typeI	TRUE	TRUE	FALSE	5	-0.0660	-0.0658	-0.0660	-0.0015	-0.00115	-0.0013
5:	power	TRUE	TRUE	TRUE	10	0.0281	0.0280	0.0300	0.0013	0.00185	0.0025
6:	typeI	TRUE	TRUE	TRUE	10	-0.0389	-0.0377	-0.0376	-0.0005	0.00075	0.0011
7:	power	TRUE	TRUE	TRUE	5	0.0391	0.0387	0.0400	0.0050	0.00530	0.0053
8:	typeI	TRUE	TRUE	TRUE	5	-0.0660	-0.0660	-0.0660	-0.0016	-0.00120	-0.0012
9:	power	TRUE	FALSE	TRUE	10	0.0175	0.0173	0.0188	0.0233	0.02086	0.0221
10:	typeI	TRUE	FALSE	TRUE	10	-0.0036	-0.0036	-0.0036	-0.0045	-0.00451	-0.0040
11:	power	TRUE	FALSE	TRUE	5	0.0275	0.0272	0.0287	0.0241	0.02347	0.0252
12:	typeI	TRUE	FALSE	TRUE	5	-0.0035	-0.0035	-0.0035	-0.0039	-0.00385	-0.0037
13:	power	TRUE	FALSE	FALSE	10	0.0175	0.0174	0.0188	0.0260	0.02586	0.0221
14:	typeI	TRUE	FALSE	FALSE	10	-0.0036	-0.0036	-0.0036	-0.0040	-0.00401	-0.0039
15:	power	TRUE	FALSE	FALSE	5	0.0275	0.0275	0.0287	0.0255	0.02554	0.0252
16:	typeI	TRUE	FALSE	FALSE	5	-0.0035	-0.0035	-0.0035	-0.0034	-0.00350	-0.0039
17:	power	FALSE	TRUE	FALSE	5	0.0244	0.0245	0.0251	0.0036	0.00360	0.0014

[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   -0.0634   -0.0632   -0.0630   -0.0041  -0.00425   -0.0037
```

4 Distribution of the estimates

4.1 2 stages

Distribution of the estimates:

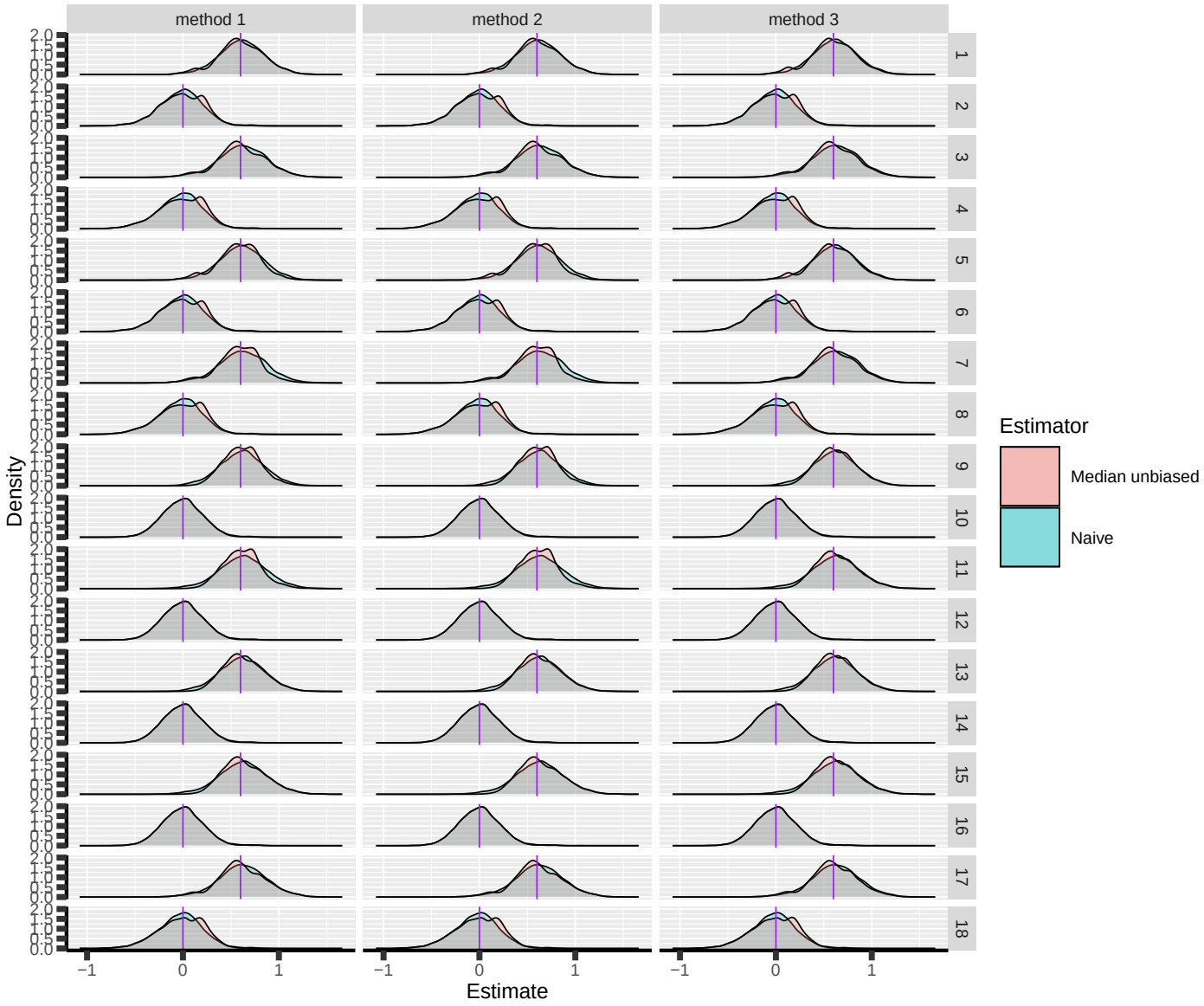

Figure 5: Naive and Median unbiased estimate distribution over all simulations. Each row correspond to a different scenario

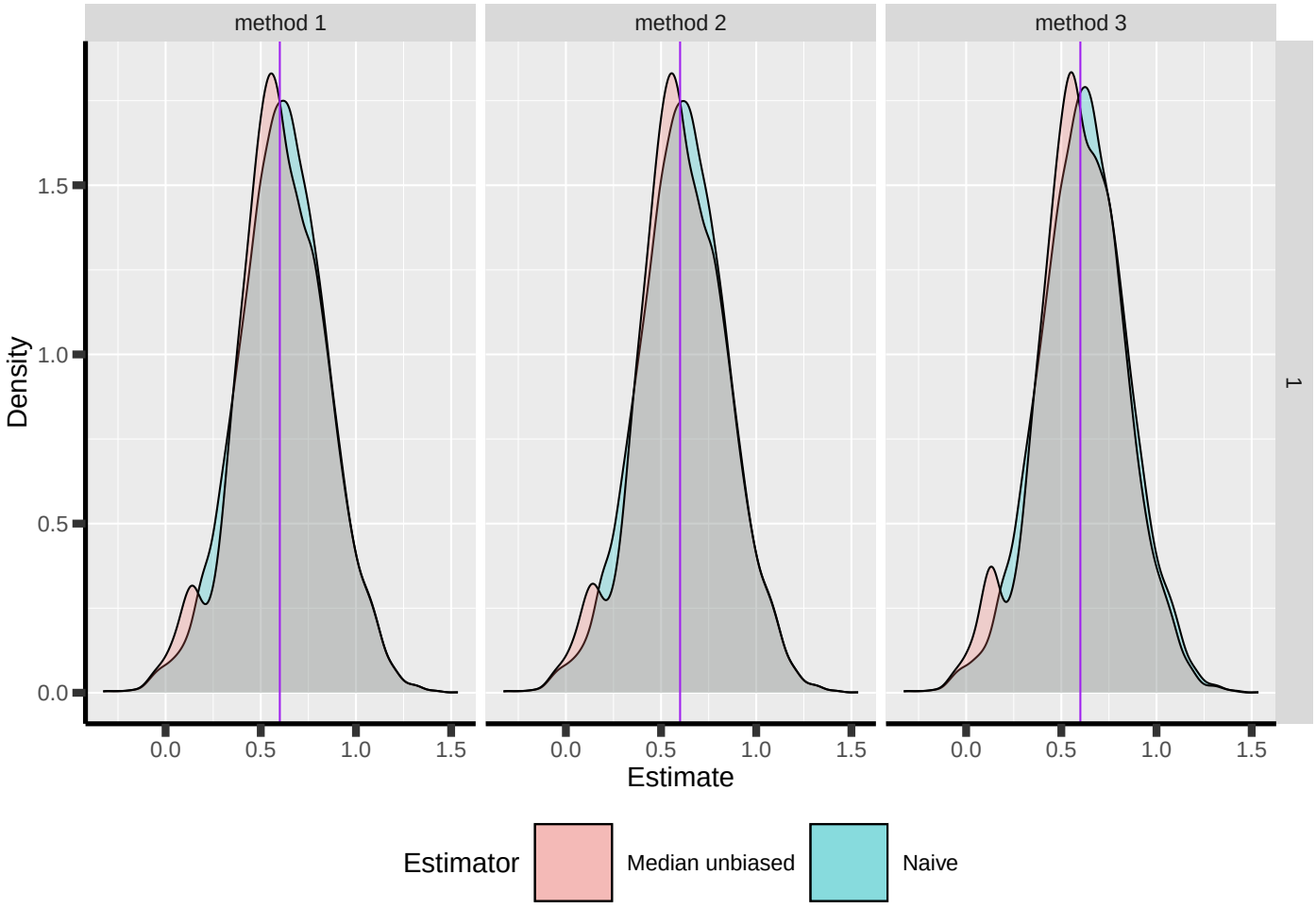

Figure 6: Same but specific to scenario 1

Distribution of the median unbiased estimate conditional to the stage:

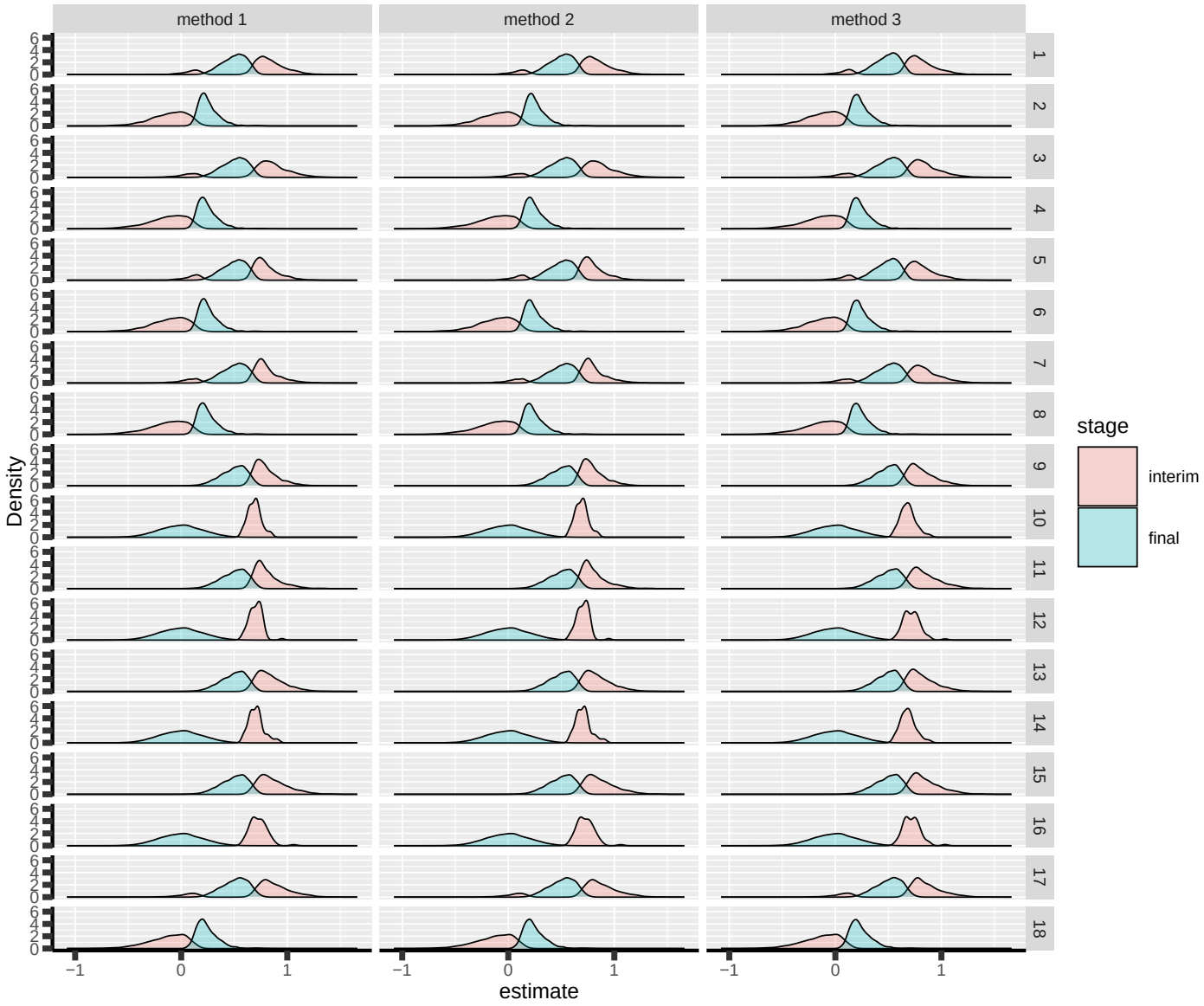

Figure 7: Median unbiased estimate distribution conditional to the stage. Each row correspond to a different scenario.

4.2 3 stages

Distribution of the estimates:

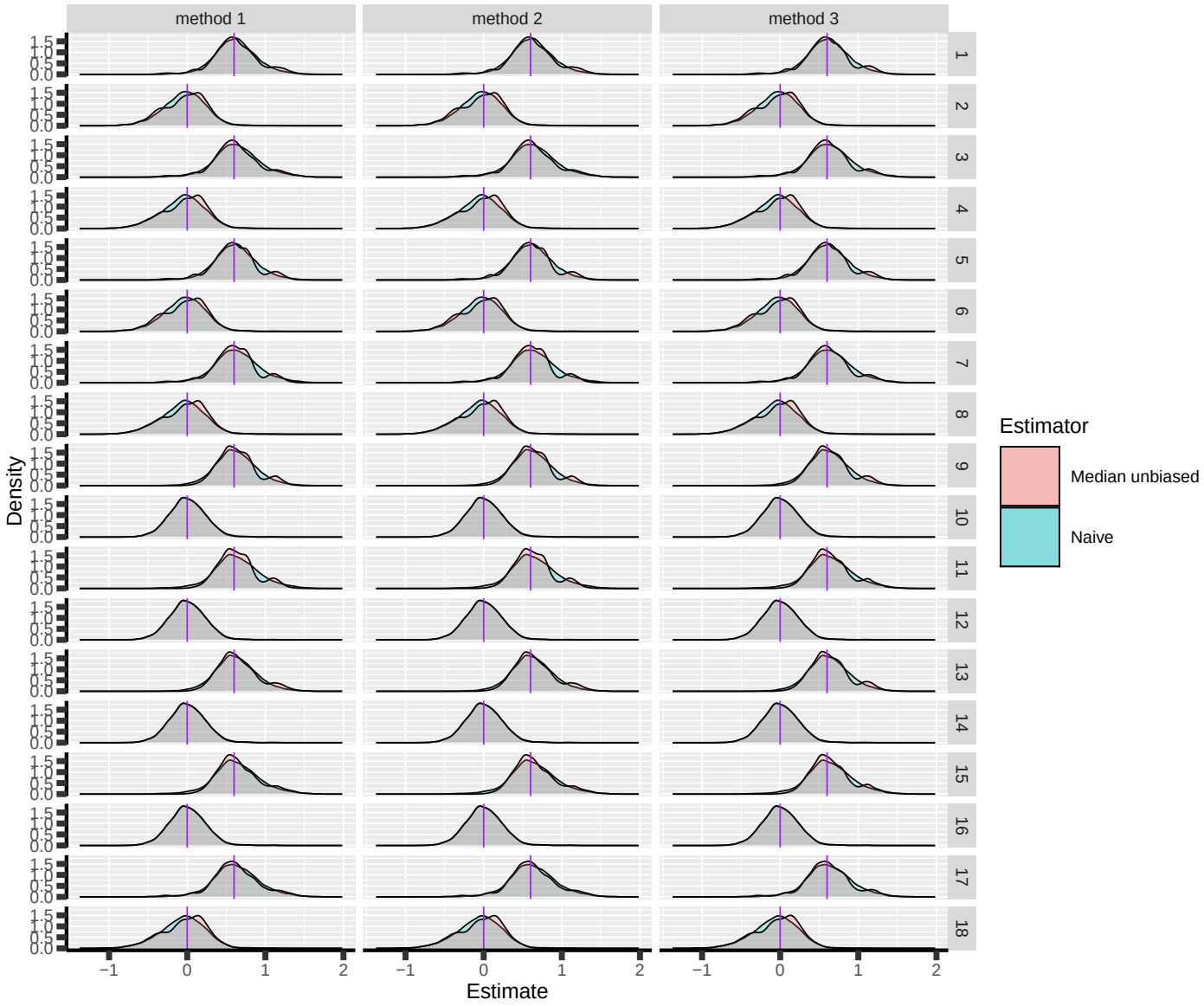

Figure 8: Naive and Median unbiased estimate distribution over all simulations. Each row correspond to a different scenario

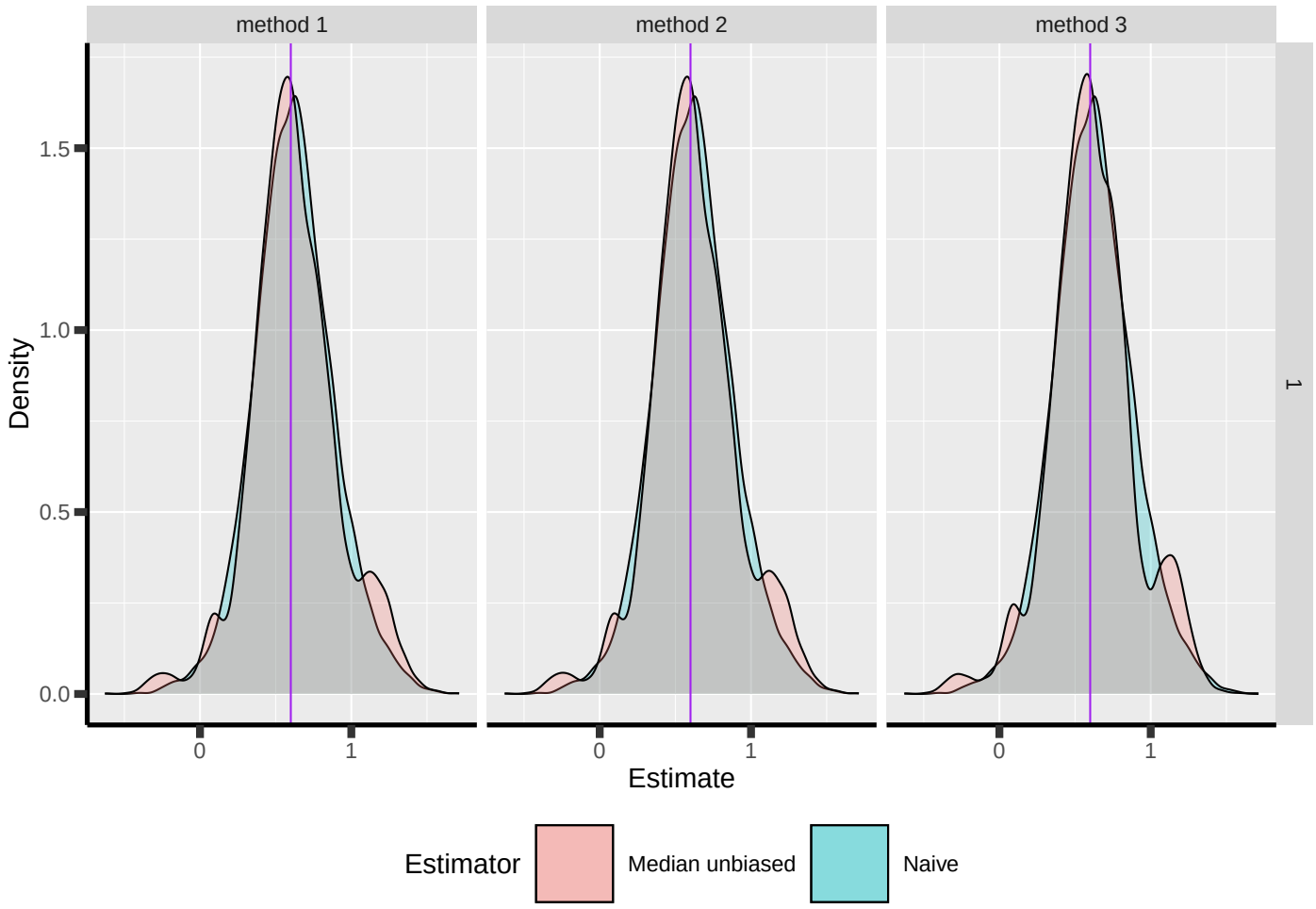

Figure 9: Same but specific to scenario 1

Distribution of the median unbiased estimate conditional to the stage:

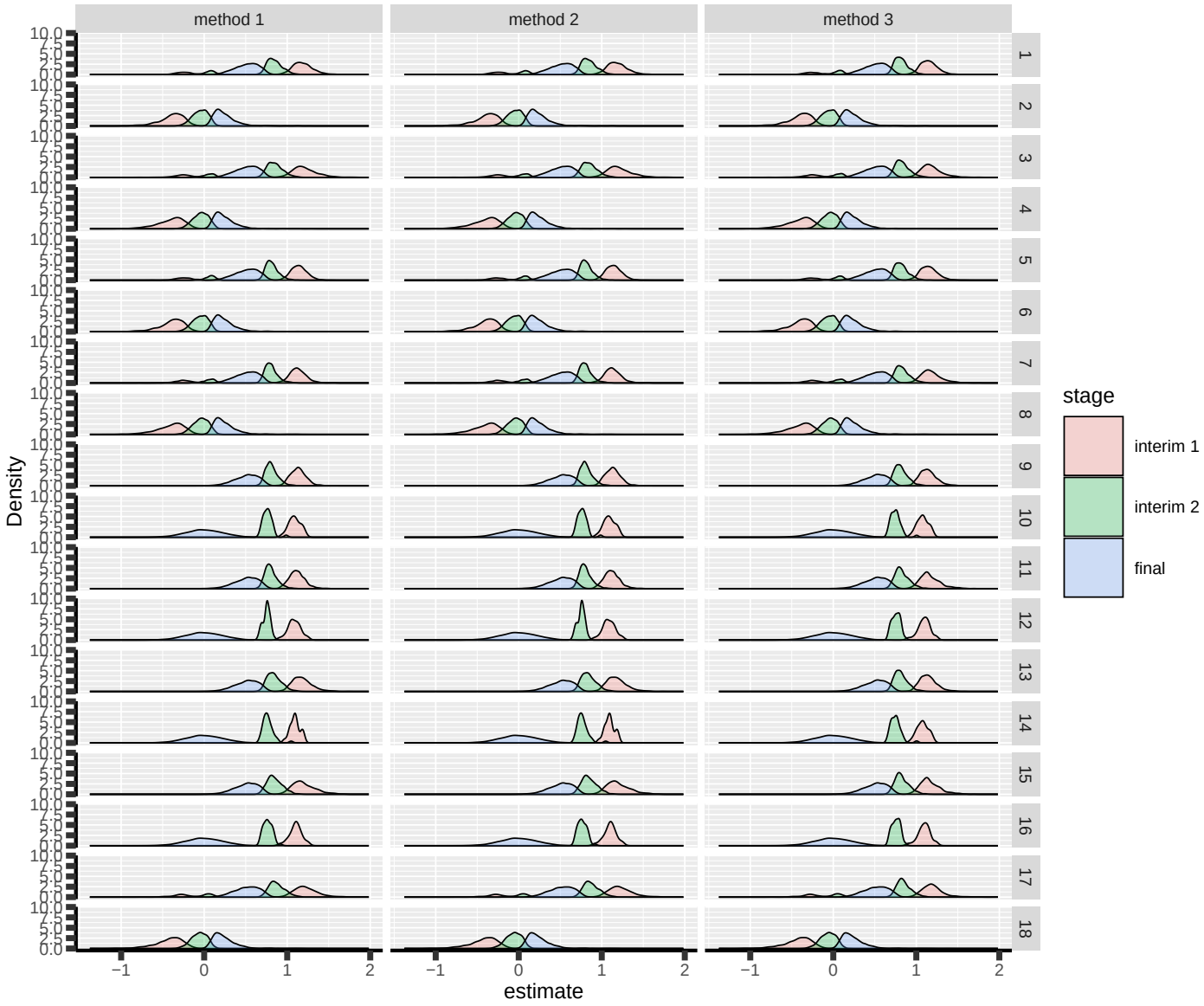

Figure 10: Median unbiased estimate distribution conditional to the stage. Each row correspond to a different scenario.

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								
decreasing information	1	0	0	1	1	0	0	1	1
	2	0	0	1	1	0	0	1	1
	3	0	0	1	1	0	0	1	1
efficacy	1	3739	81	3573	74	3739	81	3573	74
	2	3744	81	3576	74	3718	79	3545	71
	3	4165	108	3721	82	4165	108	3721	82
futility	1	632	7111	599	6932	632	7111	599	6932
	2	659	7161	600	6938	574	6940	562	6828
	3	545	6844	563	6828	545	6844	563	6828
Imax reached	1	1	1	0	0	1	1	0	0
	2	1	1	0	0	1	1	0	0
	3	1	1	0	0	1	1	0	0
no boundary crossed	1	5628	2807	5828	2994	5628	2807	5828	2994
	2	5596	2757	5824	2988	5707	2980	5893	3101
	3	5289	3047	5716	3090	5289	3047	5716	3090
stop for futility at interim	1	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0
	3	11	1	2	0	11	1	2	0

	scenario	9	10	11	12	13	14	15	16	17	18
reason	method										
efficacy	1	3849	81	3680	76	3849	81	3680	76	3396	74
	2	3829	80	3661	75	3850	81	3683	76	3400	74
	3	4238	110	3831	82	4238	110	3831	82	3528	80
futility	1	613	7122	570	6945	613	7122	570	6945	535	6748
	2	560	6975	541	6838	629	7164	574	6950	539	6755
	3	516	6890	543	6842	516	6890	543	6842	496	6642
no boundary crossed	1	5538	2797	5750	2979	5538	2797	5750	2979	6069	3178
	2	5611	2945	5798	3087	5521	2755	5743	2974	6061	3171
	3	5246	3000	5626	3076	5246	3000	5626	3076	5976	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	8	0	0	0	8	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	3021	71	3070	67	3021	71	3070	67
	2	3024	71	3073	67	2995	71	3048	65
	3	3201	82	3108	69	3201	82	3108	69
futility	1	493	6224	518	6284	493	6224	518	6284
	2	496	6235	519	6287	448	6089	503	6207
	3	444	6074	505	6236	444	6074	505	6236
no boundary crossed	1	15394	11046	15257	10881	15394	11046	15257	10881
	2	15384	11028	15252	10877	15492	11294	15308	11010
	3	15205	11302	15223	10959	15205	11302	15223	10959
stop for futility at interim	1	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0
	3	3	1	0	0	3	1	0	0

	scenario	9	10	11	12	13	14	15	16	17
reason	method									
efficacy	1	3046	68	3110	73	3046	68	3110	73	2851
	2	3028	68	3083	72	3047	68	3111	74	2853
	3	3212	77	3160	77	3212	77	3160	77	2894
futility	1	480	8907	485	9058	480	8907	485	9058	465
	2	443	8657	473	8953	481	8924	486	9063	466
	3	439	8644	477	9002	439	8644	477	9002	449
no boundary crossed	1	15352	10982	15193	10840	15352	10982	15193	10840	15625
	2	15427	11232	15243	10946	15348	10965	15189	10834	15622
	3	15160	11232	15126	10891	15160	11232	15126	10891	15586
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	3	0	1	0	3	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	0.57%	0.61%	0	0.17%	0.20%	1.07%
2:	10000	typeI	TRUE	10	TRUE	FALSE	0.10%	0.09%	0	0.11%	0.11%	0.34%
3:	10000	power	TRUE	5	TRUE	FALSE	0.08%	0.08%	0	0.07%	0.07%	0.67%
4:	10000	typeI	TRUE	5	TRUE	FALSE	0.02%	0.02%	0	0.02%	0.02%	0.13%
5:	10000	power	TRUE	10	TRUE	TRUE	0.22%	0.16%	0	0.67%	0.65%	1.07%
6:	10000	typeI	TRUE	10	TRUE	TRUE	0.02%	0.01%	0	0.21%	0.21%	0.34%
7:	10000	power	TRUE	5	TRUE	TRUE	0.02%	0.02%	0	0.46%	0.45%	0.67%
8:	10000	typeI	TRUE	5	TRUE	TRUE	0	0	0	0.08%	0.08%	0.13%
9:	10000	power	TRUE	10	FALSE	TRUE	0.14%	0.11%	0	0.58%	0.55%	1.04%
10:	10000	typeI	TRUE	10	FALSE	TRUE	0	0	0	0.20%	0.19%	0.33%
11:	10000	power	TRUE	5	FALSE	TRUE	0.01%	0.01%	0	0.46%	0.44%	0.60%
12:	10000	typeI	TRUE	5	FALSE	TRUE	0	0	0	0.06%	0.06%	0.09%
13:	10000	power	TRUE	10	FALSE	FALSE	0.41%	0.42%	0	0.21%	0.22%	1.04%
14:	10000	typeI	TRUE	10	FALSE	FALSE	0	0	0	0.12%	0.12%	0.33%
15:	10000	power	TRUE	5	FALSE	FALSE	0.03%	0.03%	0	0.04%	0.04%	0.60%
16:	10000	typeI	TRUE	5	FALSE	FALSE	0	0	0	0.01%	0.01%	0.09%
17:	10000	power	FALSE	5	TRUE	FALSE	0.06%	0.07%	0	0.04%	0.04%	0.63%
18:	10000	typeI	FALSE	5	TRUE	FALSE	0.01%	0.01%	0	0.01%	0.01%	0.12%

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	0.25%	0.25%	0	0.08%	0.08%	0.73%
2:	10000	typeI	TRUE	10	TRUE	FALSE	0.06%	0.06%	0	0.06%	0.06%	0.22%
3:	10000	typeI	TRUE	5	TRUE	FALSE	0	0	0	0.01%	0.01%	0.06%
4:	10000	power	TRUE	10	TRUE	TRUE	0.04%	0.04%	0	0.54%	0.50%	0.73%
5:	10000	typeI	TRUE	10	TRUE	TRUE	0.01%	0.01%	0	0.14%	0.14%	0.22%
6:	10000	power	TRUE	5	TRUE	TRUE	0	0	0	0.36%	0.35%	0.45%
7:	10000	typeI	TRUE	5	TRUE	TRUE	0	0	0	0.06%	0.06%	0.06%
8:	10000	power	TRUE	10	FALSE	TRUE	0.05%	0.04%	0	0.47%	0.46%	0.57%
9:	9990	typeI	TRUE	10	FALSE	TRUE	0	0	0	0.18%	0.18%	0.22%
10:	10000	power	TRUE	5	FALSE	TRUE	0.01%	0.01%	0	0.29%	0.28%	0.32%
11:	10000	typeI	TRUE	5	FALSE	TRUE	0	0	0	0.10%	0.09%	0.11%
12:	10000	power	TRUE	10	FALSE	FALSE	0.21%	0.21%	0	0.09%	0.09%	0.57%
13:	9990	typeI	TRUE	10	FALSE	FALSE	0	0	0	0.06%	0.06%	0.22%
14:	10000	power	TRUE	5	FALSE	FALSE	0.01%	0.01%	0	0.01%	0.01%	0.32%
15:	10000	typeI	TRUE	5	FALSE	FALSE	0	0	0	0	0	0.11%

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
4:	typeI	TRUE	5	TRUE	FALSE	0	0	0
5:	power	TRUE	10	TRUE	TRUE	0	0	0.04%
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	0.04%	0.04%	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	0.04%	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	0.01%	0.01%	0
2:	typeI	TRUE	10	TRUE	FALSE	0.38%	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	0.40%	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	0.01%	0.01%	0
12:	typeI	TRUE	5	FALSE	TRUE	0	0	0
13:	power	TRUE	10	FALSE	FALSE	0	0.01%	0
14:	typeI	TRUE	10	FALSE	FALSE	0	0	0
15:	power	TRUE	5	FALSE	FALSE	0.01%	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 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 (NA: 0.05%)
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 (NA: 0.05%)
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: 32.62%)	0 (NA: 30.38%)	0 (NA: 31.41%)
10:	typeI	TRUE	10	FALSE	TRUE	0 (NA: 0.21%)	0 (NA: 0.19%)	0 (NA: 0.34%)
11:	power	TRUE	5	FALSE	TRUE	0 (NA: 30.64%)	0 (NA: 29.26%)	0 (NA: 30.24%)
12:	typeI	TRUE	5	FALSE	TRUE	0 (NA: 0.06%)	0 (NA: 0.06%)	0 (NA: 0.09%)
13:	power	TRUE	10	FALSE	FALSE	0 (NA: 30.41%)	0 (NA: 31.13%)	0 (NA: 31.41%)
14:	typeI	TRUE	10	FALSE	FALSE	0 (NA: 0.12%)	0 (NA: 0.12%)	0 (NA: 0.34%)
15:	power	TRUE	5	FALSE	FALSE	0 (NA: 29.09%)	0 (NA: 29.28%)	0 (NA: 30.24%)
16:	typeI	TRUE	5	FALSE	FALSE	0 (NA: 0.01%)	0 (NA: 0.01%)	0 (NA: 0.09%)
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 (NA: 0.02%)	0 (NA: 0.02%)	0 (NA: 0.01%)
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 (NA: 0.02%)	0 (NA: 0.02%)	0 (NA: 0.01%)
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: 0.03%)	0 (NA: 0.02%)	0 (NA: 0.01%)
10:	typeI	TRUE	10	FALSE	TRUE	0	0	0
11:	power	TRUE	5	FALSE	TRUE	0 (NA: 0.01%)	0 (NA: 0.02%)	0 (NA: 0.02%)
12:	typeI	TRUE	5	FALSE	TRUE	0	0	0
13:	power	TRUE	10	FALSE	FALSE	0 (NA: 0.02%)	0 (NA: 0.02%)	0 (NA: 0.01%)
14:	typeI	TRUE	10	FALSE	FALSE	0	0	0
15:	power	TRUE	5	FALSE	FALSE	0 (NA: 0.01%)	0 (NA: 0.01%)	0 (NA: 0.02%)
16:	typeI	TRUE	5	FALSE	FALSE	0	0	0

```
17: power   FALSE  5    TRUE FALSE 0 (NA: 0.02%) 0 (NA: 0.02%) 0 (NA: 0.03%)
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 0.04% (NA: 0.12%)     0 (NA: 0.12%)  0.04% (NA: 0.85%)
 2: typeI    TRUE 10    TRUE FALSE     0 (NA: 0.03%)     0 (NA: 0.03%)       0 (NA: 0.09%)
 3: power    TRUE  5    TRUE FALSE             0.08%                 0       0 (NA: 0.42%)
 4: typeI    TRUE  5    TRUE FALSE                0                 0       0 (NA: 0.01%)
 5: power    TRUE 10    TRUE  TRUE 0.04% (NA: 0.61%) 0.04% (NA: 0.61%)       0 (NA: 0.85%)
 6: typeI    TRUE 10    TRUE  TRUE     0 (NA: 0.07%) 0.01% (NA: 0.07%)  0.01% (NA: 0.09%)
 7: power    TRUE  5    TRUE  TRUE 0.08% (NA: 0.31%)     0 (NA: 0.31%)  0.04% (NA: 0.42%)
 8: typeI    TRUE  5    TRUE  TRUE     0 (NA: 0.01%) 0.01% (NA: 0.01%)       0 (NA: 0.01%)
 9: power    TRUE 10   FALSE  TRUE    0 (NA: 20.21%)    0 (NA: 18.83%)     0 (NA: 19.41%)
10: typeI    TRUE 10   FALSE  TRUE     0 (NA: 0.18%)     0 (NA: 0.18%)       0 (NA: 0.23%)
11: power    TRUE  5   FALSE  TRUE    0 (NA: 19.98%)    0 (NA: 19.51%)     0 (NA: 19.91%)
12: typeI    TRUE  5   FALSE  TRUE     0 (NA: 0.10%)     0 (NA: 0.09%)       0 (NA: 0.11%)
13: power    TRUE 10   FALSE FALSE    0 (NA: 18.51%)    0 (NA: 18.54%)     0 (NA: 19.41%)
14: typeI    TRUE 10   FALSE FALSE     0 (NA: 0.06%)     0 (NA: 0.06%)       0 (NA: 0.23%)
15: power    TRUE  5   FALSE FALSE    0 (NA: 19.10%)    0 (NA: 19.13%) 0.05% (NA: 19.91%)
16: typeI    TRUE  5   FALSE FALSE                0                 0       0 (NA: 0.11%)
17: power   FALSE  5    TRUE FALSE             0.04%             0.04%       0 (NA: 0.43%)
18: typeI   FALSE  5    TRUE FALSE                0                 0       0 (NA: 0.02%)
```

When concluding for efficacy:

```
     hypo missing ar binding  fixC      method 1      method 2      method 3
 1: power    TRUE 10    TRUE FALSE             0         0.01%             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         0.01%             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         0.01% 0 (NA: 0.01%)
10: typeI    TRUE 10   FALSE  TRUE             0             0             0
11: power    TRUE  5   FALSE  TRUE         0.01%             0         0.01%
12: typeI    TRUE  5   FALSE  TRUE             0             0             0
13: power    TRUE 10   FALSE FALSE             0             0 0 (NA: 0.01%)
14: typeI    TRUE 10   FALSE FALSE             0             0             0
```

```
15: power    TRUE  5   FALSE FALSE         0.01%             0             0
16: typeI    TRUE  5   FALSE FALSE             0             0             0
17: power   FALSE  5    TRUE FALSE 0 (NA: 0.01%) 0 (NA: 0.01%) 0 (NA: 0.01%)
18: typeI   FALSE  5    TRUE FALSE             0             0             0
```

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;0.9147]     [0;0.9147]     [0;0.9147]
 2:    TRUE    TRUE FALSE 10 typeI [1e-04;0.9999] [1e-04;0.9999] [1e-04;0.9999]
 3:    TRUE    TRUE FALSE  5 power     [0;0.9015]     [0;0.9015]     [0;0.9015]
 4:    TRUE    TRUE FALSE  5 typeI [1e-04;0.9998] [1e-04;0.9998] [1e-04;0.9998]
 5:    TRUE    TRUE  TRUE 10 power     [0;0.9147]     [0;0.9147]     [0;0.9147]
 6:    TRUE    TRUE  TRUE 10 typeI [2e-04;0.9999] [2e-04;0.9999] [1e-04;0.9999]
 7:    TRUE    TRUE  TRUE  5 power     [0;0.9015]     [0;0.9015]     [0;0.9015]
 8:    TRUE    TRUE  TRUE  5 typeI [3e-04;0.9998] [3e-04;0.9998] [1e-04;0.9998]
 9:    TRUE   FALSE  TRUE 10 power          [0;1]          [0;1]          [0;1]
10:    TRUE   FALSE  TRUE 10 typeI      [1e-04;1]      [1e-04;1]      [1e-04;1]
11:    TRUE   FALSE  TRUE  5 power          [0;1]          [0;1]          [0;1]
12:    TRUE   FALSE  TRUE  5 typeI      [2e-04;1]      [2e-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]      [1e-04;1]
15:    TRUE   FALSE FALSE  5 power          [0;1]          [0;1]          [0;1]
16:    TRUE   FALSE FALSE  5 typeI          [0;1]          [0;1]      [1e-04;1]
17:   FALSE    TRUE FALSE  5 power     [0;0.9642]     [0;0.9642]     [0;0.9642]
18:   FALSE    TRUE FALSE  5 typeI          [0;1]          [0;1]      [1e-04;1]
```

7.3.2 3 stages

	missing	binding	fixC	ar	hypo	method 1	method 2	method 3
1:	TRUE	TRUE	FALSE	10	power	[0;0.9788]	[0;0.9788]	[0;0.9788]
2:	TRUE	TRUE	FALSE	10	typeI	[1e-04;1]	[1e-04;1]	[3e-04;1]
3:	TRUE	TRUE	FALSE	5	power	[0;0.9884]	[0;0.9884]	[0;0.9884]
4:	TRUE	TRUE	FALSE	5	typeI	[1e-04;1]	[1e-04;1]	[1e-04;1]
5:	TRUE	TRUE	TRUE	10	power	[0;0.9788]	[0;0.9788]	[0;0.9788]
6:	TRUE	TRUE	TRUE	10	typeI	[5e-04;1]	[5e-04;1]	[3e-04;1]
7:	TRUE	TRUE	TRUE	5	power	[0;0.9884]	[0;0.9884]	[0;0.9884]
8:	TRUE	TRUE	TRUE	5	typeI	[7e-04;1]	[7e-04;1]	[1e-04;1]
9:	TRUE	FALSE	TRUE	10	power	[0;1]	[0;1]	[0;1]
10:	TRUE	FALSE	TRUE	10	typeI	[0.001;1]	[0.001;1]	[8e-04;1]
11:	TRUE	FALSE	TRUE	5	power	[0;1]	[0;1]	[0;1]
12:	TRUE	FALSE	TRUE	5	typeI	[0.0011;1]	[0.0011;1]	[3e-04;1]
13:	TRUE	FALSE	FALSE	10	power	[0;1]	[0;1]	[0;1]
14:	TRUE	FALSE	FALSE	10	typeI	[4e-04;1]	[4e-04;1]	[8e-04;1]
15:	TRUE	FALSE	FALSE	5	power	[0;1]	[0;1]	[0;1]
16:	TRUE	FALSE	FALSE	5	typeI	[3e-04;0.9998]	[3e-04;0.9999]	[3e-04;1]
17:	FALSE	TRUE	FALSE	5	power	[0;0.9868]	[0;0.9868]	[0;0.9868]
18:	FALSE	TRUE	FALSE	5	typeI	[0;1]	[0;1]	[1e-04;1]

8 Coverage

8.1 2 stages

	hypo	missing	ar	binding	fixC	method 1	method 2	method 3
1:	power	FALSE	5	TRUE	FALSE	94.79% (NA: 0.02%)	94.79% (NA: 0.02%)	95.31% (NA: 0.02%)
2:	power	TRUE	5	FALSE	FALSE	95.86% (NA: 5.72%)	95.86% (NA: 5.76%)	95.97% (NA: 5.48%)
3:	power	TRUE	5	FALSE	TRUE	97.77% (NA: 6.16%)	97.76% (NA: 5.86%)	95.97% (NA: 5.48%)
4:	power	TRUE	5	TRUE	FALSE	94.73%	94.73%	95.13%
5:	power	TRUE	5	TRUE	TRUE	96.28%	96.32%	95.13%
6:	power	TRUE	10	FALSE	FALSE	95.90% (NA: 5.95%)	95.89% (NA: 6.11%)	96.07% (NA: 5.30%)
7:	power	TRUE	10	FALSE	TRUE	97.38% (NA: 6.59%)	97.45% (NA: 6.06%)	96.07% (NA: 5.30%)
8:	power	TRUE	10	TRUE	FALSE	94.84% (NA: 0.02%)	94.82% (NA: 0.02%)	95.34% (NA: 0.02%)
9:	power	TRUE	10	TRUE	TRUE	96.26% (NA: 0.02%)	96.31% (NA: 0.02%)	95.34% (NA: 0.02%)
10:	typeI	FALSE	5	TRUE	FALSE	95.13% (NA: 0.15%)	95.13% (NA: 0.15%)	95.14% (NA: 0.17%)
11:	typeI	TRUE	5	FALSE	FALSE	94.87% (NA: 0.01%)	94.87% (NA: 0.01%)	94.96% (NA: 0.09%)
12:	typeI	TRUE	5	FALSE	TRUE	94.92% (NA: 0.06%)	94.91% (NA: 0.06%)	94.96% (NA: 0.09%)
13:	typeI	TRUE	5	TRUE	FALSE	94.81% (NA: 0.14%)	94.81% (NA: 0.14%)	94.86% (NA: 0.14%)
14:	typeI	TRUE	5	TRUE	TRUE	94.89% (NA: 0.14%)	94.90% (NA: 0.12%)	94.86% (NA: 0.14%)
15:	typeI	TRUE	10	FALSE	FALSE	95.01% (NA: 0.12%)	95.01% (NA: 0.12%)	95.29% (NA: 0.33%)
16:	typeI	TRUE	10	FALSE	TRUE	95.09% (NA: 0.20%)	95.07% (NA: 0.19%)	95.29% (NA: 0.33%)
17:	typeI	TRUE	10	TRUE	FALSE	95.16% (NA: 0.09%)	95.19% (NA: 0.10%)	95.20% (NA: 0.13%)
18:	typeI	TRUE	10	TRUE	TRUE	95.34% (NA: 0.09%)	95.36% (NA: 0.07%)	95.20% (NA: 0.13%)

Average width of the confidence intervals

	hypo	missing	ar	binding	fixC	method 1	method 2	method 3
1:	power	FALSE	5	TRUE	FALSE	1.0517	1.0517	1.053
2:	power	TRUE	5	FALSE	FALSE	1.0355	1.0355	1.036
3:	power	TRUE	5	FALSE	TRUE	1.0410	1.0414	1.036
4:	power	TRUE	5	TRUE	FALSE	1.0512	1.0512	1.052
5:	power	TRUE	5	TRUE	TRUE	1.0573	1.0571	1.052
6:	power	TRUE	10	FALSE	FALSE	1.0465	1.0463	1.046
7:	power	TRUE	10	FALSE	TRUE	1.0531	1.0541	1.046
8:	power	TRUE	10	TRUE	FALSE	1.0623	1.0625	1.061
9:	power	TRUE	10	TRUE	TRUE	1.0700	1.0697	1.061
10:	typeI	FALSE	5	TRUE	FALSE	1.0427	1.0427	1.046
11:	typeI	TRUE	5	FALSE	FALSE	0.9995	0.9994	1.012
12:	typeI	TRUE	5	FALSE	TRUE	0.9994	0.9995	1.012
13:	typeI	TRUE	5	TRUE	FALSE	1.0412	1.0411	1.045
14:	typeI	TRUE	5	TRUE	TRUE	1.0413	1.0420	1.045
15:	typeI	TRUE	10	FALSE	FALSE	0.9927	0.9926	1.040
16:	typeI	TRUE	10	FALSE	TRUE	0.9926	0.9935	1.040
17:	typeI	TRUE	10	TRUE	FALSE	1.0456	1.0450	1.056
18:	typeI	TRUE	10	TRUE	TRUE	1.0457	1.0475	1.056

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	1.0553	1.0553	1.056
2:	power	TRUE	5	FALSE	FALSE	1.0476	1.0476	1.049
3:	power	TRUE	5	FALSE	TRUE	1.0530	1.0529	1.049
4:	power	TRUE	5	TRUE	FALSE	1.0555	1.0556	1.056
5:	power	TRUE	5	TRUE	TRUE	1.0608	1.0605	1.056
6:	power	TRUE	10	FALSE	FALSE	1.0534	1.0533	1.053
7:	power	TRUE	10	FALSE	TRUE	1.0601	1.0605	1.053
8:	power	TRUE	10	TRUE	FALSE	1.0640	1.0643	1.062
9:	power	TRUE	10	TRUE	TRUE	1.0710	1.0706	1.062
10:	typeI	FALSE	5	TRUE	FALSE	1.0489	1.0488	1.053
11:	typeI	TRUE	5	FALSE	FALSE	0.9994	0.9994	1.013
12:	typeI	TRUE	5	FALSE	TRUE	0.9995	0.9996	1.013
13:	typeI	TRUE	5	TRUE	FALSE	1.0478	1.0478	1.052
14:	typeI	TRUE	5	TRUE	TRUE	1.0479	1.0487	1.052
15:	typeI	TRUE	10	FALSE	FALSE	0.9928	0.9926	1.041
16:	typeI	TRUE	10	FALSE	TRUE	0.9928	0.9937	1.041
17:	typeI	TRUE	10	TRUE	FALSE	1.0492	1.0486	1.060
18:	typeI	TRUE	10	TRUE	TRUE	1.0493	1.0511	1.060

8.2 3 stages

	hypo	missing	ar	binding	fixC	method 1	method 2	method 3
1:	power	FALSE	5	TRUE	FALSE	94.87% (NA: 0.01%)	94.88% (NA: 0.01%)	95.92% (NA: 0.01%)
2:	power	TRUE	5	FALSE	FALSE	95.87% (NA: 4.85%)	95.89% (NA: 4.86%)	96.70% (NA: 4.80%)
3:	power	TRUE	5	FALSE	TRUE	98.24% (NA: 5.13%)	98.24% (NA: 5.00%)	96.68% (NA: 4.79%)
4:	power	TRUE	5	TRUE	FALSE	94.63%	94.63%	95.59% (NA: 0.02%)
5:	power	TRUE	5	TRUE	TRUE	96.76%	96.74%	95.58% (NA: 0.02%)
6:	power	TRUE	10	FALSE	FALSE	96.02% (NA: 4.78%)	96.01% (NA: 4.79%)	96.77% (NA: 4.36%)
7:	power	TRUE	10	FALSE	TRUE	97.96% (NA: 5.25%)	97.95% (NA: 4.88%)	96.73% (NA: 4.36%)
8:	power	TRUE	10	TRUE	FALSE	95.05% (NA: 0.09%)	95.05% (NA: 0.09%)	95.91% (NA: 0.01%)
9:	power	TRUE	10	TRUE	TRUE	96.72% (NA: 0.04%)	96.76% (NA: 0.04%)	95.90% (NA: 0.01%)
10:	typeI	FALSE	5	TRUE	FALSE	94.95% (NA: 0.04%)	94.95% (NA: 0.04%)	95.02% (NA: 0.07%)
11:	typeI	TRUE	5	FALSE	FALSE	95.00%	95.04%	95.09% (NA: 0.11%)
12:	typeI	TRUE	5	FALSE	TRUE	95.10% (NA: 0.10%)	95.12% (NA: 0.09%)	95.11% (NA: 0.11%)
13:	typeI	TRUE	5	TRUE	FALSE	94.94% (NA: 0.04%)	94.94% (NA: 0.04%)	94.96% (NA: 0.05%)
14:	typeI	TRUE	5	TRUE	TRUE	94.99% (NA: 0.05%)	94.99% (NA: 0.05%)	94.96% (NA: 0.05%)
15:	typeI	TRUE	10	FALSE	FALSE	95.02% (NA: 0.06%)	95.04% (NA: 0.06%)	95.20% (NA: 0.22%)
16:	typeI	TRUE	10	FALSE	TRUE	95.14% (NA: 0.18%)	95.13% (NA: 0.18%)	95.17% (NA: 0.22%)
17:	typeI	TRUE	10	TRUE	FALSE	94.81% (NA: 0.11%)	94.81% (NA: 0.11%)	94.92% (NA: 0.19%)
18:	typeI	TRUE	10	TRUE	TRUE	94.94% (NA: 0.15%)	94.90% (NA: 0.15%)	94.91% (NA: 0.18%)

Average width of the confidence intervals

	hypo	missing	ar	binding	fixC	method 1	method 2	method 3
1:	power	FALSE	5	TRUE	FALSE	1.0589	1.0590	1.0601
2:	power	TRUE	5	FALSE	FALSE	1.0454	1.0454	1.0468
3:	power	TRUE	5	FALSE	TRUE	1.0497	1.0497	1.0469
4:	power	TRUE	5	TRUE	FALSE	1.0611	1.0611	1.0622
5:	power	TRUE	5	TRUE	TRUE	1.0656	1.0651	1.0622
6:	power	TRUE	10	FALSE	FALSE	1.0702	1.0703	1.0740
7:	power	TRUE	10	FALSE	TRUE	1.0765	1.0766	1.0740
8:	power	TRUE	10	TRUE	FALSE	1.0854	1.0855	1.0888
9:	power	TRUE	10	TRUE	TRUE	1.0923	1.0909	1.0888
10:	typeI	FALSE	5	TRUE	FALSE	1.0850	1.0850	1.0860
11:	typeI	TRUE	5	FALSE	FALSE	0.9966	0.9967	0.9991
12:	typeI	TRUE	5	FALSE	TRUE	0.9964	0.9965	0.9994
13:	typeI	TRUE	5	TRUE	FALSE	1.0840	1.0840	1.0853
14:	typeI	TRUE	5	TRUE	TRUE	1.0841	1.0838	1.0853
15:	typeI	TRUE	10	FALSE	FALSE	0.9938	0.9937	1.0070
16:	typeI	TRUE	10	FALSE	TRUE	0.9936	0.9939	1.0071
17:	typeI	TRUE	10	TRUE	FALSE	1.1229	1.1230	1.1275
18:	typeI	TRUE	10	TRUE	TRUE	1.1230	1.1218	1.1275

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	1.0578	1.0579	1.0589
2:	power	TRUE	5	FALSE	FALSE	1.0530	1.0530	1.0543
3:	power	TRUE	5	FALSE	TRUE	1.0564	1.0562	1.0543
4:	power	TRUE	5	TRUE	FALSE	1.0606	1.0606	1.0617
5:	power	TRUE	5	TRUE	TRUE	1.0639	1.0634	1.0617
6:	power	TRUE	10	FALSE	FALSE	1.0725	1.0726	1.0755
7:	power	TRUE	10	FALSE	TRUE	1.0779	1.0775	1.0756
8:	power	TRUE	10	TRUE	FALSE	1.0825	1.0826	1.0856
9:	power	TRUE	10	TRUE	TRUE	1.0883	1.0870	1.0856
10:	typeI	FALSE	5	TRUE	FALSE	1.0879	1.0879	1.0891
11:	typeI	TRUE	5	FALSE	FALSE	0.9964	0.9965	0.9993
12:	typeI	TRUE	5	FALSE	TRUE	0.9964	0.9965	0.9996
13:	typeI	TRUE	5	TRUE	FALSE	1.0880	1.0880	1.0894
14:	typeI	TRUE	5	TRUE	TRUE	1.0880	1.0877	1.0894
15:	typeI	TRUE	10	FALSE	FALSE	0.9938	0.9937	1.0074
16:	typeI	TRUE	10	FALSE	TRUE	0.9937	0.9941	1.0075
17:	typeI	TRUE	10	TRUE	FALSE	1.1230	1.1232	1.1279
18:	typeI	TRUE	10	TRUE	TRUE	1.1231	1.1216	1.1279

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	79.52	9.591	10.888
2:	1	TRUE	5	typeI	FALSE	TRUE	10000	79.52	9.591	10.888
3:	1	TRUE	5	power	TRUE	TRUE	10000	79.52	9.591	10.888
4:	1	TRUE	5	typeI	TRUE	TRUE	10000	79.52	9.591	10.888
5:	1	TRUE	5	power	TRUE	FALSE	10000	79.64	9.442	10.914
6:	1	TRUE	5	typeI	TRUE	FALSE	10000	79.64	9.442	10.914
7:	1	TRUE	5	power	FALSE	FALSE	10000	79.64	9.442	10.914
8:	1	TRUE	5	typeI	FALSE	FALSE	10000	79.64	9.442	10.914
9:	1	FALSE	5	power	FALSE	TRUE	10000	87.79	6.090	6.121
10:	1	FALSE	5	typeI	FALSE	TRUE	10000	87.79	6.090	6.121
11:	1	TRUE	10	power	FALSE	TRUE	10000	71.60	13.354	15.049
12:	1	TRUE	10	typeI	FALSE	TRUE	10000	71.60	13.354	15.049
13:	1	TRUE	10	power	TRUE	TRUE	10000	71.60	13.354	15.049
14:	1	TRUE	10	typeI	TRUE	TRUE	10000	71.60	13.354	15.049
15:	1	TRUE	10	power	TRUE	FALSE	10000	71.80	13.162	15.042
16:	1	TRUE	10	typeI	TRUE	FALSE	10000	71.80	13.162	15.042
17:	1	TRUE	10	power	FALSE	FALSE	10000	71.80	13.162	15.042
18:	1	TRUE	10	typeI	FALSE	FALSE	10000	71.80	13.162	15.042

10 Information (2 stages)

Percentage of information for method 1[5]:

scenario	missing	binding	fixC	ar	interim	decision	final
1	TRUE	TRUE	FALSE	10	54.64	75.34	102.70
2	TRUE	TRUE	FALSE	10	54.64	74.98	102.37
3	TRUE	TRUE	FALSE	5	53.27	64.04	102.74
4	TRUE	TRUE	FALSE	5	53.27	63.58	102.37
5	TRUE	TRUE	TRUE	10	54.64	75.34	102.70
6	TRUE	TRUE	TRUE	10	54.64	74.98	102.37
7	TRUE	TRUE	TRUE	5	53.27	64.04	102.74
8	TRUE	TRUE	TRUE	5	53.27	63.58	102.37
9	TRUE	FALSE	TRUE	10	54.50	74.96	102.54
10	TRUE	FALSE	TRUE	10	54.50	75.17	103.13
11	TRUE	FALSE	TRUE	5	53.16	63.72	102.63
12	TRUE	FALSE	TRUE	5	53.16	64.61	103.13
13	TRUE	FALSE	FALSE	10	54.50	74.96	102.54
14	TRUE	FALSE	FALSE	10	54.50	75.17	103.13
15	TRUE	FALSE	FALSE	5	53.16	63.72	102.63
16	TRUE	FALSE	FALSE	5	53.16	64.61	103.13
17	FALSE	TRUE	FALSE	5	52.07	63.77	99.97
18	FALSE	TRUE	FALSE	5	52.07	63.22	99.63

Similar results for other methods.

[5] average over the reached stages