Replicate script

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Replicate.R script

This loads in the simulations created during the codecheck after executing `population.R` and `sim.R`. Note that to reduce computation time for the codecheck, the number of simulations was reduced from 500 to 50.

```
 [1] "apparent.discr"      "ext1.app.discr"      "ext1.total.discr"
 [4] "ext2.app.discr"      "ext2.total.discr"    "boot0.632.discr"
 [7] "boot.opt.discr"      "boot0.632.discr.90ci" "boot0.632.discr.95ci"
[10] "boot.oos.90ci.discr" "boot.oos.95ci.discr" "apparent.cal"
[13] "ext1.app.cal"        "ext1.total.cal"      "ext2.app.cal"
[16] "ext2.total.cal"      "boot0.632.cal"       "boot.opt.cal"
[19] "boot0.632.cal.90ci"  "boot0.632.cal.95ci"  "boot.oos.90ci.cal"
[22] "boot.oos.90ci.cal"   "risk.cal"            "rmspe"
[25] "time.elapsed.sec"
```

```
       cstat         sd       upp        low    statistic sample.size
1  0.5865439 0.035197066 0.6217409 0.5513468 cforbendelta         500
2  0.5988743 0.041716166 0.6405905 0.5571582    cforbeny0         500
3  0.5975469 0.030474903 0.6280218 0.5670720         mbcb         500
4  0.6110042 0.036734848 0.6477390 0.5742693   cforbennew         500
5  0.5779827 0.016952162 0.5949349 0.5610306      theta_d         500
6  0.5834772 0.029353692 0.6128309 0.5541236 cforbendelta         750
7  0.5946543 0.033842417 0.6284968 0.5608119    cforbeny0         750
8  0.5949698 0.026458125 0.6214280 0.5685117         mbcb         750
9  0.6067403 0.029462780 0.6362031 0.5772775   cforbennew         750
10 0.5821278 0.009145110 0.5912730 0.5729827      theta_d         750
11 0.5845368 0.025839568 0.6103763 0.5586972 cforbendelta        1000
12 0.5945721 0.030024276 0.6245964 0.5645478    cforbeny0        1000
13 0.5949573 0.022668978 0.6176262 0.5722883         mbcb        1000
```

```
14 0.6056754 0.025891329 0.6315667 0.5797841   cforbennew        1000
15 0.5839368 0.006288036 0.5902248 0.5776487      theta_d        1000


       cstat          sd       upp       low    statistic sample.size
1  0.5681921 0.039791064 0.6079832 0.5284011 cforbendelta         500
2  0.5835579 0.037155114 0.6207130 0.5464028    cforbeny0         500
3  0.5761704 0.039873137 0.6160435 0.5362973         mbcb         500
4  0.5942065 0.034175108 0.6283816 0.5600314   cforbennew         500
5  0.5779827 0.016952162 0.5949349 0.5610306      theta_d         500
6  0.5715723 0.032838015 0.6044103 0.5387343 cforbendelta         750
7  0.5848388 0.030434672 0.6152735 0.5544041    cforbeny0         750
8  0.5811245 0.032498961 0.6136235 0.5486255         mbcb         750
9  0.5951473 0.028153021 0.6233003 0.5669943   cforbennew         750
10 0.5821278 0.009145110 0.5912730 0.5729827      theta_d         750
11 0.5762545 0.027764691 0.6040192 0.5484899 cforbendelta        1000
12 0.5875507 0.026902286 0.6144530 0.5606484    cforbeny0        1000
13 0.5852679 0.026492487 0.6117604 0.5587754         mbcb        1000
14 0.5972383 0.024944194 0.6221825 0.5722941   cforbennew        1000
15 0.5839368 0.006288036 0.5902248 0.5776487      theta_d        1000


       cstat          sd       upp       low    statistic sample.size
1  0.5692247 0.041201991 0.6104267 0.5280227 cforbendelta         500
2  0.5815205 0.046618250 0.6281388 0.5349023    cforbeny0         500
3  0.5777891 0.037558708 0.6153478 0.5402304         mbcb         500
4  0.5869280 0.052585712 0.6395137 0.5343423   cforbennew         500
5  0.5779827 0.016952162 0.5949349 0.5610306      theta_d         500
6  0.5719327 0.033048685 0.6049814 0.5388841 cforbendelta         750
7  0.5827177 0.037071376 0.6197890 0.5456463    cforbeny0         750
8  0.5818237 0.030937145 0.6127608 0.5508866         mbcb         750
9  0.5896406 0.040184994 0.6298256 0.5494556   cforbennew         750
10 0.5821278 0.009145110 0.5912730 0.5729827      theta_d         750
11 0.5761607 0.028303864 0.6044646 0.5478569 cforbendelta        1000
12 0.5856671 0.032182190 0.6178493 0.5534849    cforbeny0        1000
13 0.5853371 0.025687168 0.6110242 0.5596499         mbcb        1000
14 0.5923651 0.034187399 0.6265525 0.5581777   cforbennew        1000
15 0.5839368 0.006288036 0.5902248 0.5776487      theta_d        1000


       cstat          sd       upp       low    statistic sample.size
1  0.5699967 0.030618051 0.6006148 0.5393787 cforbendelta         500
2  0.5793323 0.035991534 0.6153239 0.5433408    cforbeny0         500
3  0.5782211 0.029265840 0.6074870 0.5489553         mbcb         500
4  0.5898862 0.029534132 0.6194204 0.5603521   cforbennew         500
```
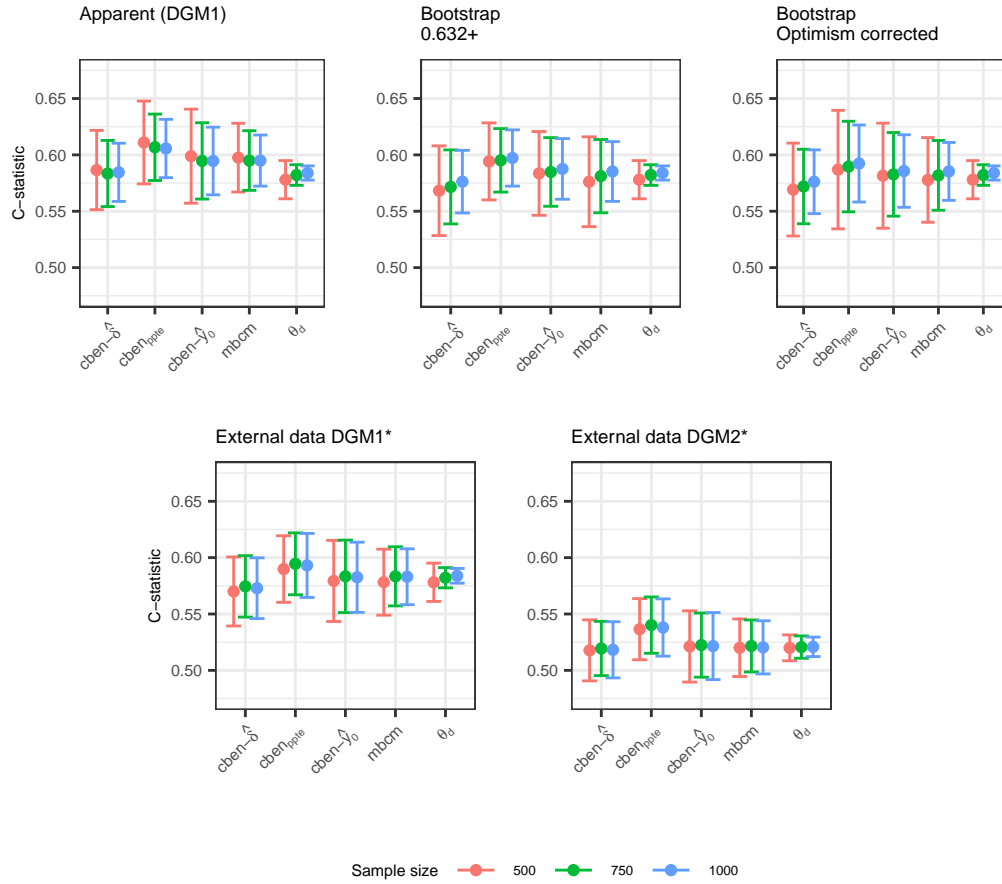
	cstat	sd	upp	low	statistic	sample.size
5	0.5781475	0.016993361	0.5951408	0.5611541	theta_d	500
6	0.5745045	0.027248535	0.6017530	0.5472559	cforbendelta	750
7	0.5833987	0.032145160	0.6155439	0.5512535	cforbeny0	750
8	0.5834054	0.026217999	0.6096234	0.5571874	mbcb	750
9	0.5945177	0.027466882	0.6219846	0.5670509	cforbennew	750
10	0.5821551	0.008986610	0.5911417	0.5731685	theta_d	750
11	0.5728782	0.026962234	0.5998405	0.5459160	cforbendelta	1000
12	0.5825806	0.031116307	0.6136969	0.5514643	cforbeny0	1000
13	0.5830443	0.024795578	0.6078399	0.5582487	mbcb	1000
14	0.5930832	0.028401273	0.6214844	0.5646819	cforbennew	1000
15	0.5838900	0.006528296	0.5904183	0.5773617	theta_d	1000

	cstat	sd	upp	low	statistic	sample.size
1	0.5177557	0.027065072	0.5448208	0.4906906	cforbendelta	500
2	0.5212212	0.031608473	0.5528297	0.4896128	cforbeny0	500
3	0.5200508	0.025528435	0.5455792	0.4945224	mbcb	500
4	0.5365093	0.027126481	0.5636357	0.5093828	cforbennew	500
5	0.5199888	0.011501773	0.5314905	0.5084870	theta_d	500
6	0.5193809	0.024094824	0.5434757	0.4952860	cforbendelta	750
7	0.5224241	0.028475815	0.5508999	0.4939483	cforbeny0	750
8	0.5216471	0.023066368	0.5447135	0.4985807	mbcb	750
9	0.5401311	0.024989812	0.5651209	0.5151413	cforbennew	750
10	0.5206548	0.009898813	0.5305536	0.5107560	theta_d	750
11	0.5182250	0.024898912	0.5431239	0.4933261	cforbendelta	1000
12	0.5215245	0.029738783	0.5512633	0.4917857	cforbeny0	1000
13	0.5203912	0.023571423	0.5439626	0.4968197	mbcb	1000
14	0.5380004	0.025418967	0.5634194	0.5125814	cforbennew	1000
15	0.5208671	0.008651285	0.5295184	0.5122158	theta_d	1000

Apparent (DGM1)

Bootstrap
0.632+

Bootstrap
Optimism corrected

External data DGM1*

External data DGM2*

Sample size ● 500 ● 750 ● 1000

	cstat	sd	upp	low	statistic	sample.size
1	0.008561130	0.03539334	0.04395447	-0.026832211	cforbendelta	500
2	0.020891590	0.04139343	0.06228502	-0.020501842	cforbeny0	500
3	0.019564208	0.03061850	0.05018271	-0.011054293	mbcb	500
4	0.033021432	0.03733107	0.07035251	-0.004309641	cforbennew	500
5	0.001349400	0.02815207	0.02950147	-0.026802666	cforbendelta	750
6	0.012526500	0.03263117	0.04515767	-0.020104671	cforbeny0	750
7	0.012841990	0.02510430	0.03794629	-0.012262312	mbcb	750
8	0.024612471	0.02803762	0.05265009	-0.003425152	cforbennew	750
9	0.000600005	0.02458595	0.02518596	-0.023985947	cforbendelta	1000
10	0.010635316	0.02887762	0.03951294	-0.018242306	cforbeny0	1000
11	0.011020490	0.02119227	0.03221276	-0.010171781	mbcb	1000
12	0.021738619	0.02475538	0.04649400	-0.003016762	cforbennew	1000

	cstat	sd	upp	low	statistic	sample.size

	cstat	sd	upp	low	statistic	sample.size
1	-0.009790596	0.03934809	0.02955749	-0.04913868	cforbendelta	500
2	0.005575159	0.03684405	0.04241921	-0.03126889	cforbeny0	500
3	-0.001812338	0.03884634	0.03703400	-0.04065868	mbcb	500
4	0.016223742	0.03422068	0.05044442	-0.01799693	cforbennew	500
5	-0.010555550	0.03123662	0.02068107	-0.04179217	cforbendelta	750
6	0.002710953	0.02900308	0.03171404	-0.02629213	cforbeny0	750
7	-0.001003359	0.03072220	0.02971884	-0.03172556	mbcb	750
8	0.013019442	0.02659750	0.03961694	-0.01357806	cforbennew	750
9	-0.007682227	0.02634340	0.01866117	-0.03402562	cforbendelta	1000
10	0.003613935	0.02542117	0.02903510	-0.02180723	cforbeny0	1000
11	0.001331127	0.02482659	0.02615772	-0.02349546	mbcb	1000
12	0.013301566	0.02345780	0.03675936	-0.01015623	cforbennew	1000

	cstat	sd	upp	low	statistic	sample.size
1	-0.0087580652	0.04051633	0.03175827	-0.04927440	cforbendelta	500
2	0.0035377947	0.04602294	0.04956073	-0.04248515	cforbeny0	500
3	-0.0001936423	0.03673495	0.03654131	-0.03692860	mbcb	500
4	0.0089452380	0.05250097	0.06144621	-0.04355574	cforbennew	500
5	-0.0101951080	0.03151499	0.02131988	-0.04171010	cforbendelta	750
6	0.0005898155	0.03575819	0.03634801	-0.03516838	cforbeny0	750
7	-0.0003041510	0.02926037	0.02895622	-0.02956452	mbcb	750
8	0.0075127723	0.03859941	0.04611218	-0.03108663	cforbennew	750
9	-0.0077760459	0.02690685	0.01913080	-0.03468290	cforbendelta	1000
10	0.0017303198	0.03097588	0.03270620	-0.02924556	cforbeny0	1000
11	0.0014002920	0.02409151	0.02549180	-0.02269121	mbcb	1000
12	0.0084283347	0.03320529	0.04163362	-0.02477696	cforbennew	1000

	cstat	sd	upp	low	statistic	sample.size
1	-8.150742e-03	0.02599717	0.01784643	-0.03414791	cforbendelta	500
2	1.184837e-03	0.03139832	0.03258316	-0.03021349	cforbeny0	500
3	7.362482e-05	0.02288654	0.02296016	-0.02281291	mbcb	500
4	1.173875e-02	0.02640280	0.03814155	-0.01466405	cforbennew	500
5	-7.650649e-03	0.02642117	0.01877052	-0.03407181	cforbendelta	750
6	1.243589e-03	0.03062979	0.03187338	-0.02938620	cforbeny0	750
7	1.250284e-03	0.02504571	0.02629600	-0.02379543	mbcb	750
8	1.236264e-02	0.02706323	0.03942588	-0.01470059	cforbennew	750
9	-1.101176e-02	0.02686098	0.01584922	-0.03787273	cforbendelta	1000
10	-1.309335e-03	0.03064364	0.02933430	-0.03195297	cforbeny0	1000
11	-8.456939e-04	0.02440098	0.02355529	-0.02524668	mbcb	1000
12	9.193194e-03	0.02798195	0.03717514	-0.01878875	cforbennew	1000

	cstat	sd	upp	low	statistic	sample.size

```
1   -2.233034e-03 0.02462087 0.02238783 -0.026853900 cforbendelta  500
2    1.232489e-03 0.02959399 0.03082648 -0.028361499   cforbeny0   500
3    6.204246e-05 0.02277321 0.02283525 -0.022711164        mbcb   500
4    1.652049e-02 0.02528518 0.04180567 -0.008764686   cforbennew  500
5   -1.273958e-03 0.02331686 0.02204291 -0.024590823 cforbendelta  750
6    1.769275e-03 0.02757900 0.02934827 -0.025809720   cforbeny0   750
7    9.922829e-04 0.02156981 0.02256209 -0.020577528        mbcb   750
8    1.947631e-02 0.02427012 0.04374643 -0.004793812   cforbennew  750
9   -2.642110e-03 0.02416429 0.02152218 -0.026806401 cforbendelta 1000
10   6.573724e-04 0.02834664 0.02900402 -0.027689270   cforbeny0  1000
11  -4.759449e-04 0.02209092 0.02161498 -0.022566869        mbcb  1000
12   1.713329e-02 0.02474093 0.04187423 -0.007607644   cforbennew 1000
```
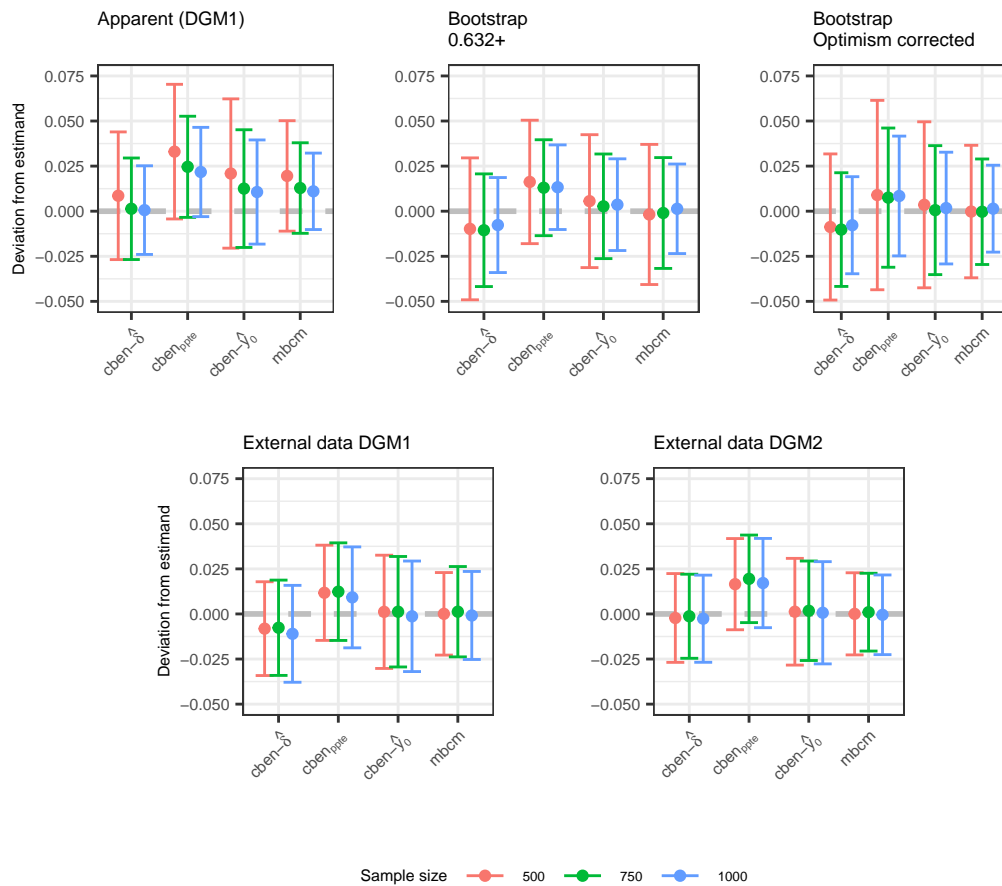

% latex table generated in R 4.4.2 by xtable 1.8-4 package

```
% Sat Dec 14 07:51:26 2024
\begin{table}[ht]
\centering
\begin{tabular}{rlllll}
  \hline
 & 1 & 2 & 3 & 4 \\
  \hline
apparent.discr & 0.036,0.028,0.025 & 0.05,0.037,0.033 & 0.046,0.035,0.031 & 0.036,0.028,0.024
  ext1.app.discr & 0.027,0.027,0.029 & 0.029,0.03,0.029 & 0.033,0.032,0.029 & 0.037,0.028,0.0
  ext2.app.discr & 0.025,0.023,0.024 & 0.03,0.031,0.03 & 0.042,0.042,0.042 & 0.085,0.08,0.078
  boot0.632.discr & 0.041,0.033,0.027 & 0.038,0.03,0.027 & 0.037,0.029,0.026 & 0.039,0.031,0
  boot.opt.discr & 0.041,0.033,0.028 & 0.053,0.039,0.034 & 0.046,0.036,0.031 & 0.037,0.029,0
  ext1.total.discr & 0.027,0.027,0.029 & 0.029,0.03,0.029 & 0.031,0.031,0.031 & 0.023,0.025,0
  ext2.total.discr & 0.025,0.023,0.024 & 0.03,0.031,0.03 & 0.03,0.028,0.028 & 0.023,0.022,0.0
   \hline
\end{tabular}
\end{table}
```

```
            mean           sd          upp           low  statistic sample.size
1  -4.794730e-11 1.752756e-10 1.273283e-10 -2.232229e-10    emp.int         500
2  -1.366212e-01 1.885394e-01 5.191829e-02 -3.251606e-01   true.int         500
3   1.000000e+00 4.087790e-10 1.000000e+00  1.000000e+00  emp.slope         500
4   8.078761e-01 2.078815e-01 1.015758e+00  5.999945e-01 true.slope         500
5  -2.558405e-11 1.149490e-10 8.936497e-11 -1.405331e-10    emp.int         750
6  -9.137230e-02 1.780623e-01 8.669004e-02 -2.694346e-01   true.int         750
7   1.000000e+00 2.614513e-10 1.000000e+00  1.000000e+00  emp.slope         750
8   8.763272e-01 2.106283e-01 1.086956e+00  6.656990e-01 true.slope         750
9  -3.855106e-11 1.185684e-10 8.001730e-11 -1.571194e-10    emp.int        1000
10 -6.769499e-02 1.598721e-01 9.217709e-02 -2.275671e-01   true.int        1000
11  1.000000e+00 1.590536e-10 1.000000e+00  1.000000e+00  emp.slope        1000
12  9.016371e-01 1.893662e-01 1.091003e+00  7.122709e-01 true.slope        1000
```

```
        mean         sd       upp       low  statistic sample.size
1         NA         NA        NA        NA    emp.int         500
2         NA         NA        NA        NA   true.int         500
3  0.8468382 0.20738573 1.054224 0.6394525  emp.slope         500
4  0.8078761 0.20788154 1.015758 0.5999945 true.slope         500
5         NA         NA        NA        NA    emp.int         750
6         NA         NA        NA        NA   true.int         750
7  0.9433830 0.09780614 1.041189 0.8455769  emp.slope         750
8  0.8763272 0.21062828 1.086956 0.6656990 true.slope         750
9         NA         NA        NA        NA    emp.int        1000
```

7

```
10        NA         NA         NA        NA  true.int          1000
11 0.9798228 0.04805040 1.027873 0.9317724  emp.slope         1000
12 0.9016371 0.18936615 1.091003 0.7122709 true.slope         1000
```

	mean	sd	upp	low	statistic	sample.size
1	-0.037959527	0.04031784	0.002358317	-0.07827737	emp.int	500
2	-0.136621156	0.18853945	0.051918292	-0.32516060	true.int	500
3	0.946546794	0.05654176	1.003088549	0.89000504	emp.slope	500
4	0.807876079	0.20788154	1.015757622	0.59999454	true.slope	500
5	-0.015677624	0.02254062	0.006862994	-0.03821824	emp.int	750
6	-0.091372304	0.17806234	0.086690036	-0.26943464	true.int	750
7	0.976970882	0.03170539	1.008676275	0.94526549	emp.slope	750
8	0.876327233	0.21062828	1.086955510	0.66569896	true.slope	750
9	-0.007347315	0.01229143	0.004944119	-0.01963875	emp.int	1000
10	-0.067694988	0.15987208	0.092177095	-0.22756707	true.int	1000
11	0.989582455	0.01745407	1.007036522	0.97212839	emp.slope	1000
12	0.901637064	0.18936615	1.091003216	0.71227091	true.slope	1000

	mean	sd	upp	low	statistic	sample.size
1	-0.13957964	0.2521453	0.11256564	-0.3917249	emp.int	500
2	-0.13710921	0.1884454	0.05133615	-0.3255546	true.int	500
3	0.80538008	0.2834549	1.08883503	0.5219251	emp.slope	500
4	0.80605764	0.2060100	1.01206761	0.6000477	true.slope	500
5	-0.09296934	0.2521239	0.15915456	-0.3450932	emp.int	750
6	-0.09215920	0.1772456	0.08508641	-0.2694048	true.int	750
7	0.89848549	0.2979026	1.19638806	0.6005829	emp.slope	750
8	0.87558312	0.2113465	1.08692959	0.6642367	true.slope	750
9	-0.07712158	0.2452540	0.16813238	-0.3223755	emp.int	1000
10	-0.06853756	0.1589737	0.09043617	-0.2275113	true.int	1000
11	0.88259850	0.2826087	1.16520722	0.5999898	emp.slope	1000
12	0.90036224	0.1875337	1.08789593	0.7128286	true.slope	1000

	mean	sd	upp	low	statistic	sample.size
1	-0.1654574	0.22660877	0.06115134	-0.3920662	emp.int	500
2	-0.1656092	0.14659173	-0.01901748	-0.3122009	true.int	500
3	0.3710362	0.25183990	0.62287614	0.1191963	emp.slope	500
4	0.3727146	0.16830666	0.54102125	0.2044079	true.slope	500
5	-0.1403473	0.19564685	0.05529955	-0.3359941	emp.int	750
6	-0.1444982	0.13037411	-0.01412409	-0.2748723	true.int	750
7	0.4114472	0.23203072	0.64347789	0.1794164	emp.slope	750
8	0.3988872	0.14898314	0.54787037	0.2499041	true.slope	750
9	-0.1398747	0.19047338	0.05059864	-0.3303481	emp.int	1000

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10  -0.1436976  0.09991957  -0.04377802  -0.2436172    true.int       1000
11   0.3967315  0.22786560   0.62459711   0.1688659   emp.slope       1000
12   0.4003533  0.12079230   0.52114557   0.2795610  true.slope       1000
```
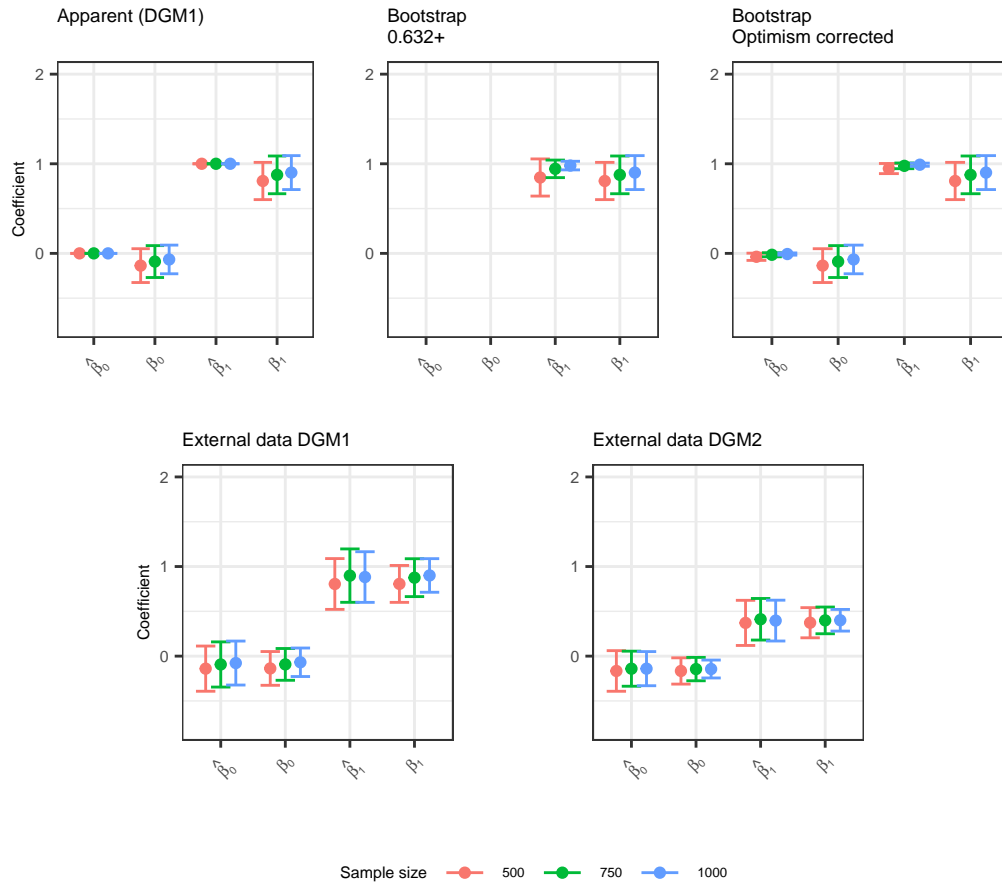


```
        mean         sd        upp          low statistic sample.size
1 0.13662116 0.1885394 0.3251606 -0.05191829       int         500
2 0.19212392 0.2078815 0.4000055 -0.01575762     slope         500
3 0.09137230 0.1780623 0.2694346 -0.08669004       int         750
4 0.12367277 0.2106283 0.3343010 -0.08695551     slope         750
5 0.06769499 0.1598721 0.2275671 -0.09217710       int        1000
6 0.09836294 0.1893662 0.2877291 -0.09100322     slope        1000


        mean         sd        upp          low statistic sample.size
1         NA         NA         NA           NA       int         500
```
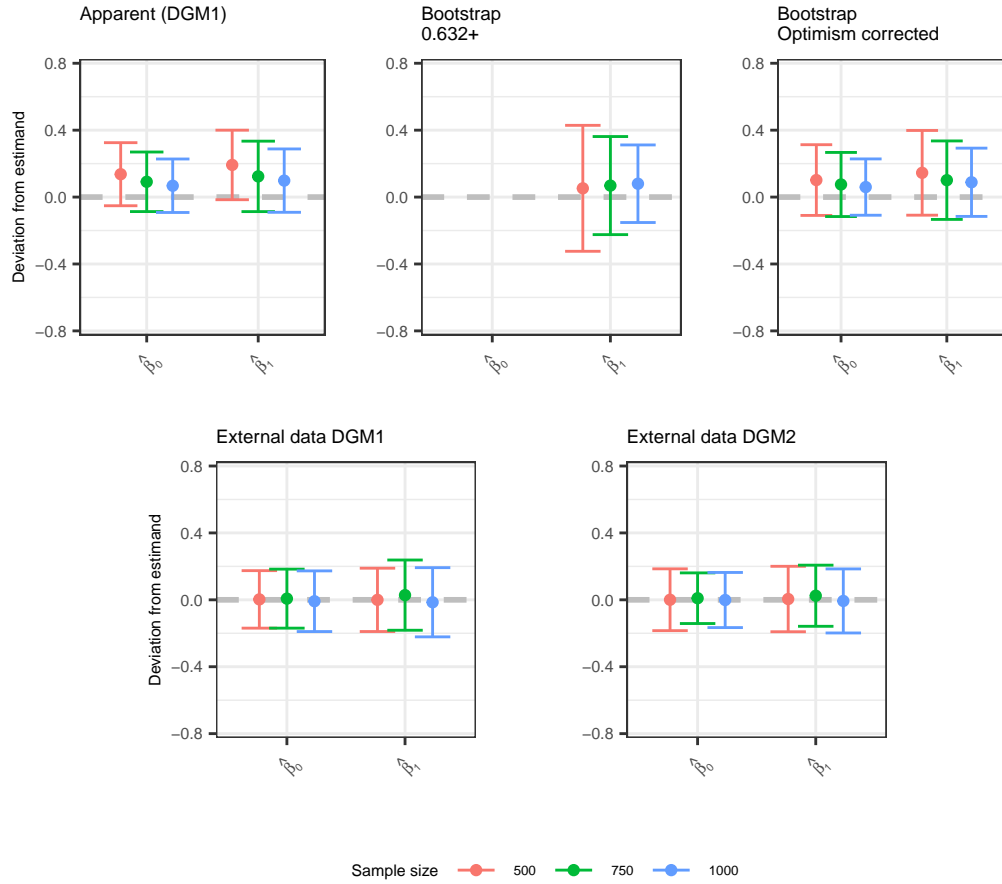
9

```
2 0.05240193 0.3764874 0.4288893 -0.3240855     slope        500
3        NA        NA        NA        NA     int          750
4 0.06866765 0.2931747 0.3618423 -0.2245070     slope        750
5        NA        NA        NA        NA     int         1000
6 0.07975627 0.2318172 0.3115735 -0.1520609     slope       1000


        mean        sd       upp        low statistic sample.size
1 0.10164873 0.2113736 0.3130224 -0.1097249       int         500
2 0.14501750 0.2532390 0.3982565 -0.1082215     slope         500
3 0.07525970 0.1916575 0.2669172 -0.1163978       int         750
4 0.10099851 0.2346099 0.3356084 -0.1336114     slope         750
5 0.05975770 0.1684078 0.2281655 -0.1086501       int        1000
6 0.08845558 0.2040805 0.2925361 -0.1156249     slope        1000


         mean        sd       upp        low statistic sample.size
1  0.0026233992 0.1718678 0.1744912 -0.1692444       int         500
2 -0.0001563897 0.1893030 0.1891466 -0.1894594     slope         500
3  0.0071399616 0.1763509 0.1834909 -0.1692110       int         750
4  0.0280150170 0.2099579 0.2379729 -0.1819429     slope         750
5 -0.0083060608 0.1813221 0.1730161 -0.1896282       int        1000
6 -0.0144947497 0.2068593 0.1923646 -0.2213541     slope        1000


         mean        sd       upp        low statistic sample.size
1  0.000479276 0.1847808 0.1852601 -0.1843015       int         500
2  0.004757752 0.1956196 0.2003774 -0.1908619     slope         500
3  0.009642852 0.1513645 0.1610074 -0.1417217       int         750
4  0.024512313 0.1828391 0.2073514 -0.1583268     slope         750
5 -0.001180803 0.1648076 0.1636268 -0.1659884       int        1000
6 -0.006711444 0.1914999 0.1847884 -0.1982113     slope        1000
```

Apparent (DGM1)

Bootstrap
0.632+

Bootstrap
Optimism corrected

Deviation from estimand

External data DGM1

External data DGM2

Deviation from estimand

Sample size   500   750   1000

```
% latex table generated in R 4.4.2 by xtable 1.8-4 package
% Sat Dec 14 07:51:29 2024
\begin{table}[ht]
\centering
\begin{tabular}{rrrrrrr}
  \hline
 & 1 & 2 & 3 & 4 & 5 & 6 \\
  \hline
apparent.cal & 0.23 & 0.20 & 0.17 & 0.28 & 0.24 & 0.21 \\
  boot0.632.cal &  &  &  & 0.38 & 0.30 & 0.24 \\
  boot.opt.cal & 0.23 & 0.21 & 0.18 & 0.29 & 0.26 & 0.22 \\
  ext1.total.cal & 0.17 & 0.18 & 0.18 & 0.19 & 0.21 & 0.21 \\
  ext2.total.cal & 0.18 & 0.15 & 0.16 & 0.20 & 0.18 & 0.19 \\
   \hline
\end{tabular}
\end{table}
```

```
\end{table}
```

Session info

```
  sessionInfo()
```

```
R version 4.4.2 (2024-10-31 ucrt)
Platform: x86_64-w64-mingw32/x64
Running under: Windows 11 x64 (build 22621)

Matrix products: default


locale:
[1] LC_COLLATE=English_United States.utf8
[2] LC_CTYPE=English_United States.utf8
[3] LC_MONETARY=English_United States.utf8
[4] LC_NUMERIC=C
[5] LC_TIME=English_United States.utf8

time zone: Europe/Amsterdam
tzcode source: internal

attached base packages:
[1] stats     graphics  grDevices utils     datasets  methods   base

other attached packages:
[1] DescTools_0.99.58 xtable_1.8-4     stringr_1.5.1     patchwork_1.3.0
[5] ggplot2_3.5.1

loaded via a namespace (and not attached):
 [1] utf8_1.2.4        generics_0.1.3    class_7.3-22      stringi_1.8.4
 [5] lattice_0.22-6    hms_1.1.3         digest_0.6.37     magrittr_2.0.3
 [9] evaluate_1.0.1    grid_4.4.2        mvtnorm_1.3-2     fastmap_1.2.0
[13] cellranger_1.1.0  plyr_1.8.9        jsonlite_1.8.9    Matrix_1.7-1
[17] e1071_1.7-16      httr_1.4.7        fansi_1.0.6       scales_1.3.0
[21] cli_3.6.3         rlang_1.1.4       expm_1.0-0        munsell_0.5.1
[25] withr_3.0.2       yaml_2.3.10       rootSolve_1.8.2.4 tools_4.4.2
[29] lmom_3.2          gld_2.6.6         Exact_3.3         dplyr_1.1.4
[33] colorspace_2.1-1  forcats_1.0.0     boot_1.3-31       vctrs_0.6.5
[37] R6_2.5.1          proxy_0.4-27      lifecycle_1.0.4   MASS_7.3-61
```

```
[41] pkgconfig_2.0.3    pillar_1.9.0      gtable_0.3.6       glue_1.8.0
[45] data.table_1.16.4 Rcpp_1.0.13-1     haven_2.5.4        xfun_0.49
[49] tibble_3.2.1       tidyselect_1.2.1  rstudioapi_0.17.1 knitr_1.49
[53] farver_2.1.2       htmltools_0.5.8.1 rmarkdown_2.29    labeling_0.4.3
[57] compiler_4.4.2     readxl_1.4.3
```