Summary of results for CIR_alpha_1_beta_1_sigma_2_x0_10

June 9, 2020

M = 10

m = 1

The following sections show density plots of the discrepancy between the respective statistic of the samples from the approximated posteriors (sampled with two-step MCMC) and the sample from the true posterior (sampled with Stan) calculated for the 100 simulated datasets.

Posterior mean

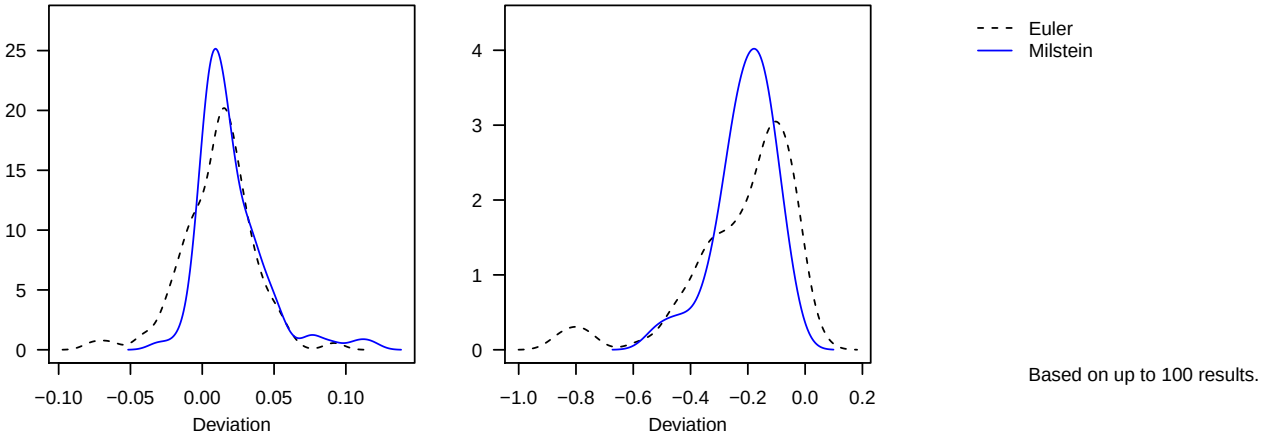


Table 1: RMSE

	beta	sigma2
Euler	0.027	0.289
Milstein	0.031	0.234

Posterior median

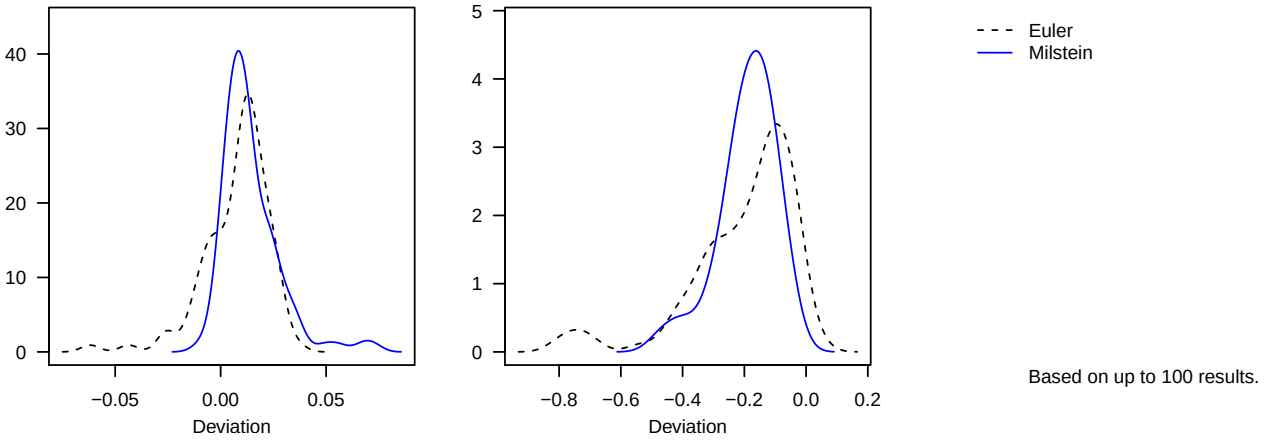


Table 2: RMSE

	beta	sigma2
Euler	0.017	0.267
Milstein	0.020	0.212

Posterior variance and covariance

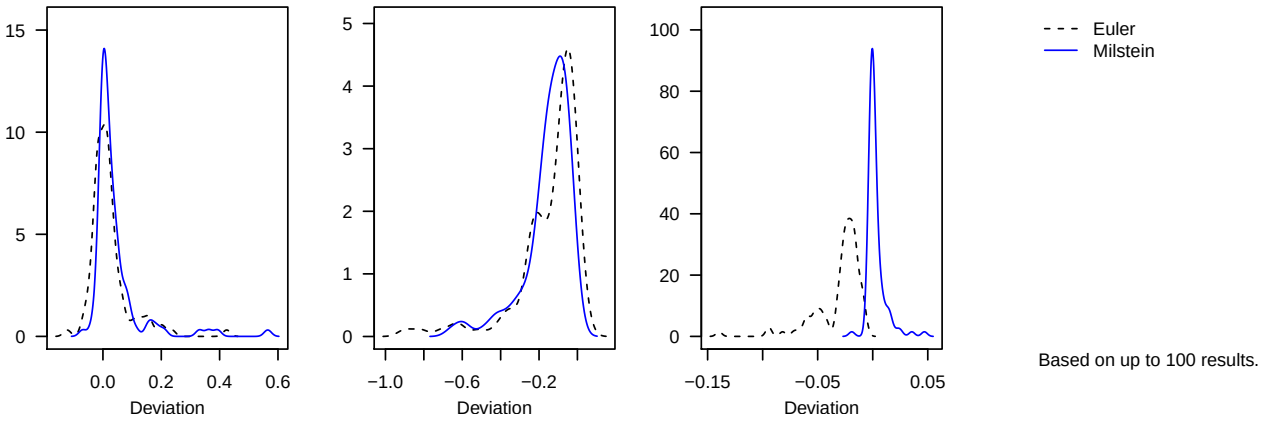


Table 3: RMSE

	beta	sigma2	covariance
Euler	0.074	0.227	0.037
Milstein	0.099	0.200	0.009

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
Euler	24240659	3498781	2347148	372207
Milstein	7769951	642363	750905	85810

Acceptance rates

	ARparam mean	ARparam sd
td_E	0.503	0.017
td_M	0.501	0.021

m = 2

`mean of # of switching to Euler for MB_td_Milstein_pd_Milstein: 0`

`total # of negative proposals:`

DBM_td_M_pd_M	MB_td_E_pd_E	MB_td_M_pd_E	MB_td_M_pd_M
102046	336023	132790	0

`ratio of negative proposals and number of iterations:`

	DBM_td_M_pd_M	MB_td_E_pd_E	MB_td_M_pd_E	MB_td_M_pd_M
min	0.0000000	0.0000000	0.0000000	0
max	0.0356418	0.0365245	0.0415423	0
median	0.0000000	0.0000000	0.0000000	0
mean	0.0003603	0.0003884	0.0004450	0

The following sections show density plots of the discrepancy between the respective statistic of the samples from the approximated posteriors (sampled with two-step MCMC) and the sample from the true posterior (sampled with Stan) calculated for the 100 simulated datasets.

Posterior mean

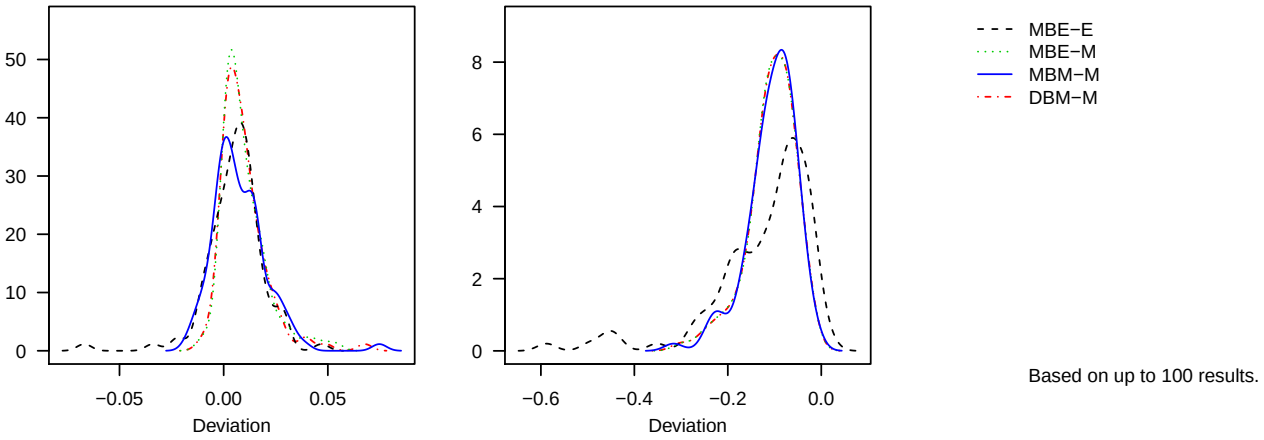


Table 8: RMSE

	beta	sigma2
MBE-E	0.015	0.168
MBE-M	0.015	0.118
MBM-M	0.015	0.118
DBM-M	0.015	0.119

Posterior median

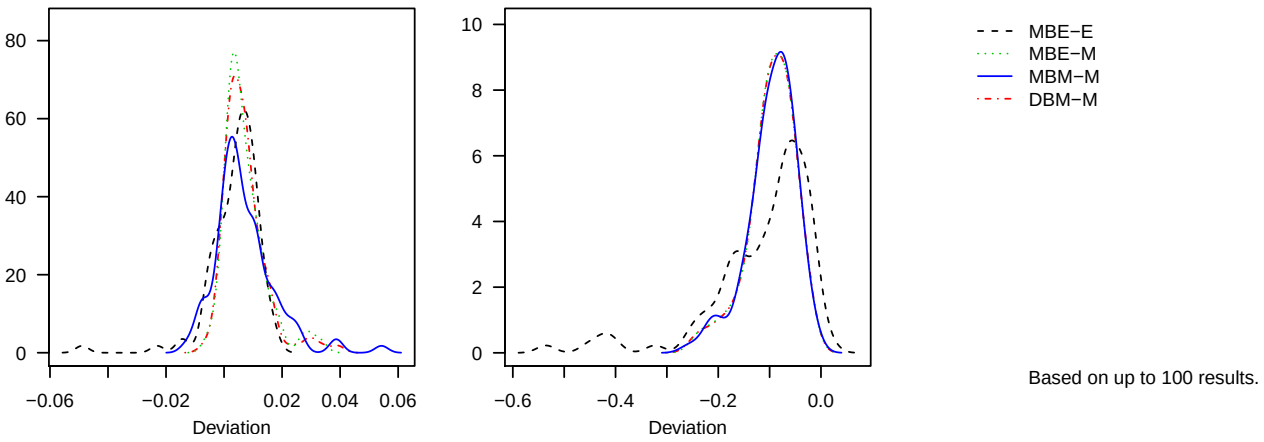


Table 9: RMSE

	beta	sigma2
MBE-E	0.010	0.154
MBE-M	0.010	0.107
MBM-M	0.013	0.107
DBM-M	0.010	0.107

Posterior variance and covariance

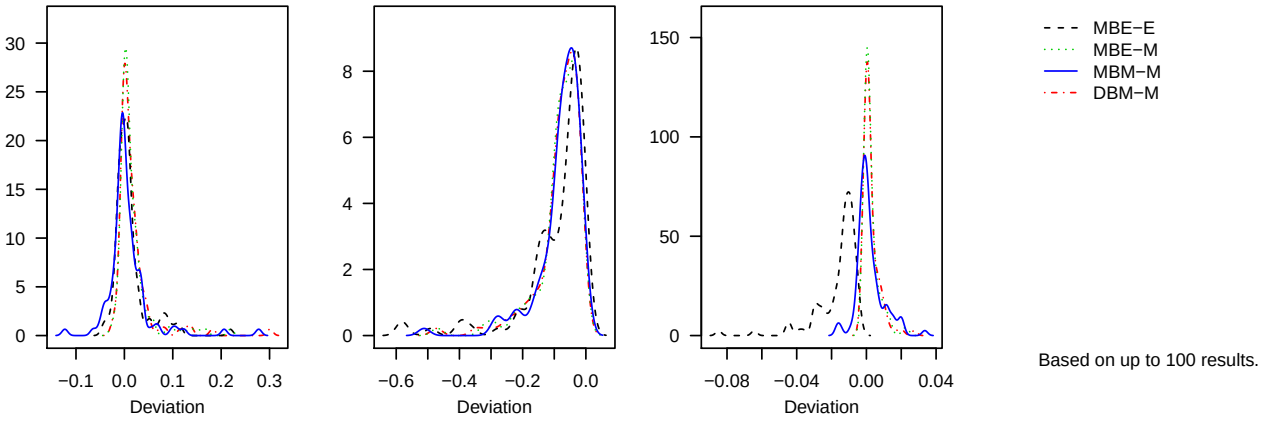


Table 10: RMSE

	beta	sigma2	covariance
MBE-E	0.039	0.146	0.020
MBE-M	0.043	0.112	0.005
MBM-M	0.047	0.109	0.008
DBM-M	0.046	0.113	0.005

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
MBE-E	8631493	425871	544853	49729
MBE-M	2946598	84951	178500	19041
MBM-M	209137	14109	13415	1884
DBM-M	2834793	136505	177950	19528

Acceptance rates

	ARpath mean	ARpath sd	ARparam mean	ARparam sd
MBE-E	0.947	0.016	0.457	0.015
MBE-M	0.938	0.016	0.456	0.016
MBM-M	1.000	0.000	0.456	0.017
DBM-M	0.954	0.012	0.456	0.017

m = 5

`mean of # of switching to Euler for MB_td_Milstein_pd_Milstein: 0`

`total # of negative proposals:`

DBM_td_M_pd_M	MB_td_E_pd_E	MB_td_M_pd_E	MB_td_M_pd_M
22132	139604	35940	0

`ratio of negative proposals and number of iterations:`

	DBM_td_M_pd_M	MB_td_E_pd_E	MB_td_M_pd_E	MB_td_M_pd_M
min	0.0000000	0.0000000	0.0000000	0
max	0.0142022	0.0199123	0.0221559	0
median	0.0000000	0.0000000	0.0000000	0
mean	0.0001422	0.0002022	0.0002252	0

The following sections show density plots of the discrepancy between the respective statistic of the samples from the approximated posteriors (sampled with two-step MCMC) and the sample from the true posterior (sampled with Stan) calculated for the 100 simulated datasets.

Posterior mean

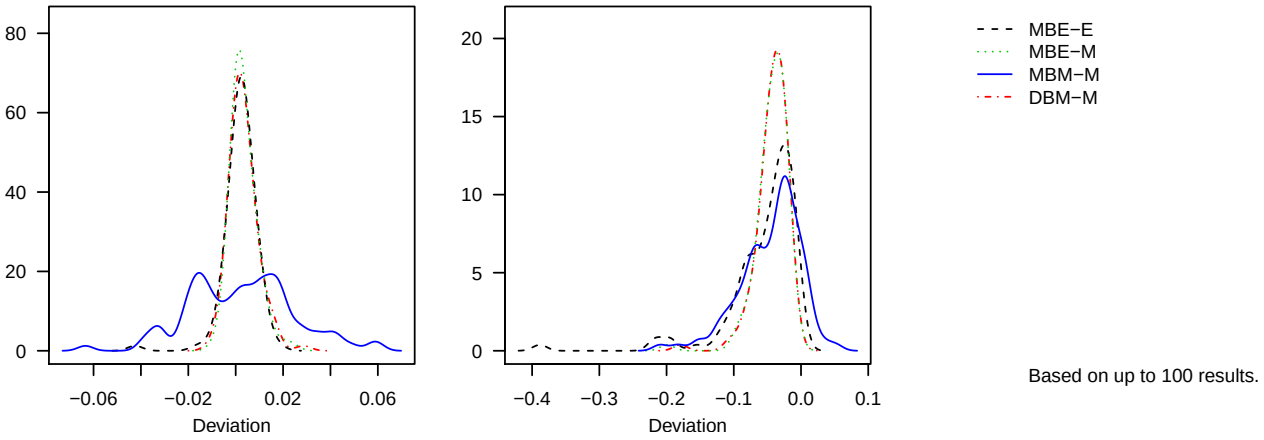


Table 15: RMSE

	beta	sigma2
MBE-E	0.007	0.079
MBE-M	0.006	0.050
MBM-M	0.022	0.064
DBM-M	0.007	0.049

Posterior median

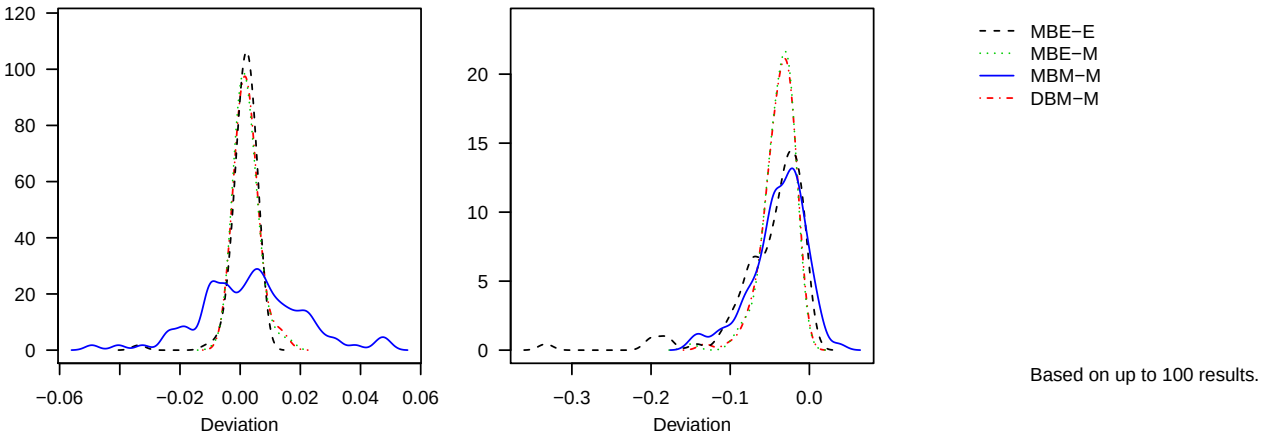


Table 16: RMSE

	beta	sigma2
MBE-E	0.005	0.071
MBE-M	0.004	0.044
MBM-M	0.018	0.053
DBM-M	0.005	0.044

Posterior variance and covariance

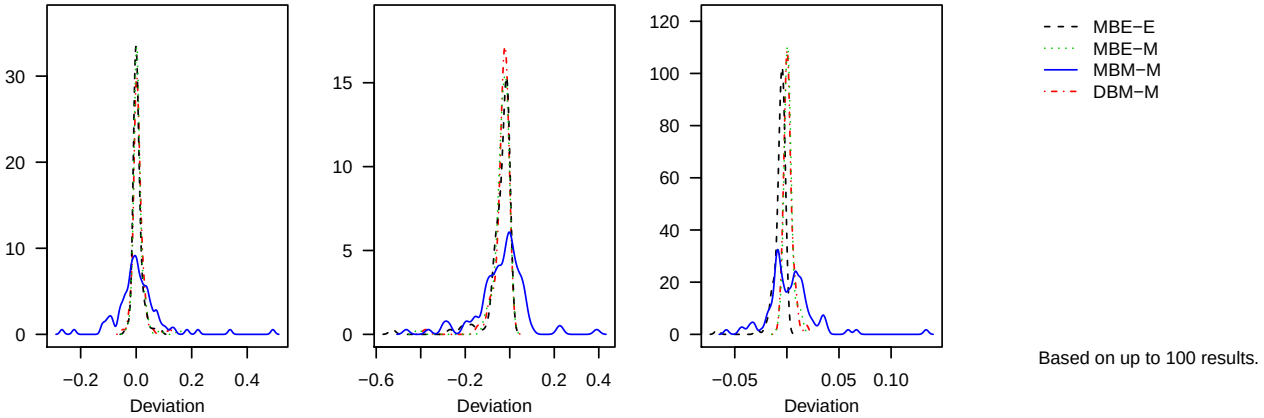


Table 17: RMSE

	beta	sigma2	covariance
MBE-E	0.018	0.081	0.010
MBE-M	0.022	0.058	0.004
MBM-M	0.091	0.119	0.024
DBM-M	0.022	0.056	0.004

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
MBE-E	7038064	209440	183744	16797
MBE-M	1610654	30179	39845	4108
MBM-M	41151	3475	986	192
DBM-M	1580017	57691	40505	4731

Acceptance rates

	ARpath mean	ARpath sd	ARparam mean	ARparam sd
MBE-E	0.965	0.011	0.349	0.011
MBE-M	0.951	0.014	0.348	0.012
MBM-M	0.986	0.001	0.348	0.012
DBM-M	0.965	0.010	0.348	0.012

	ARpath mean	ARpath sd	ARparam mean	ARparam sd

M = 20

m = 1

The following sections show density plots of the discrepancy between the respective statistic of the samples from the approximated posteriors (sampled with two-step MCMC) and the sample from the true posterior (sampled with Stan) calculated for the 100 simulated datasets.

Posterior mean

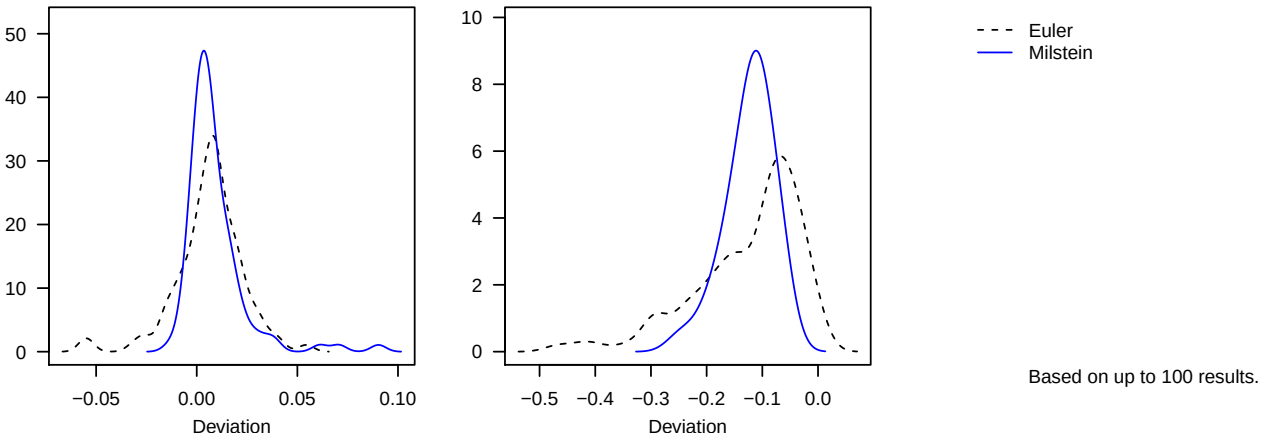


Table 20: RMSE

	beta	sigma2
Euler	0.018	0.160
Milstein	0.017	0.131

Posterior median

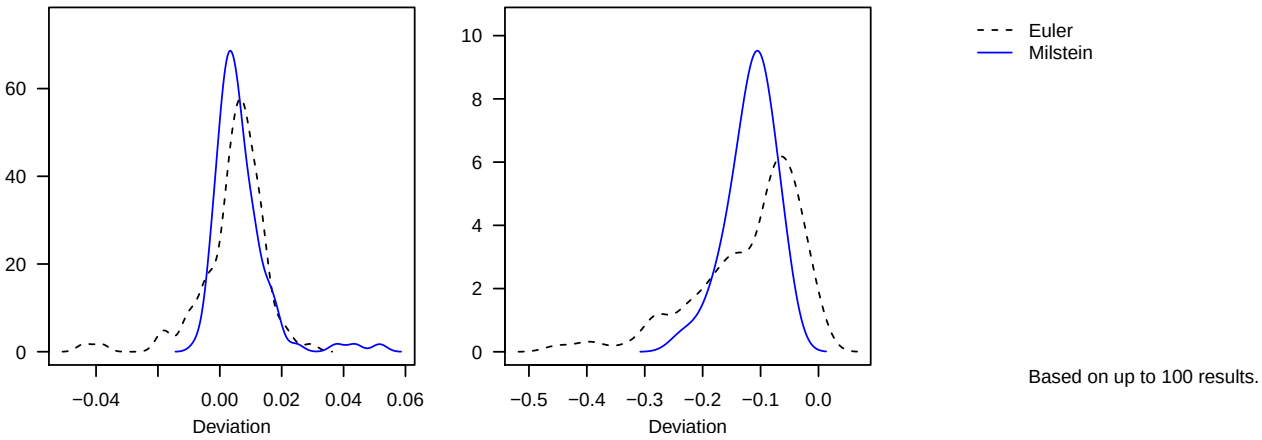


Table 21: RMSE

	beta	sigma2
Euler	0.012	0.153
Milstein	0.011	0.123

Posterior variance and covariance

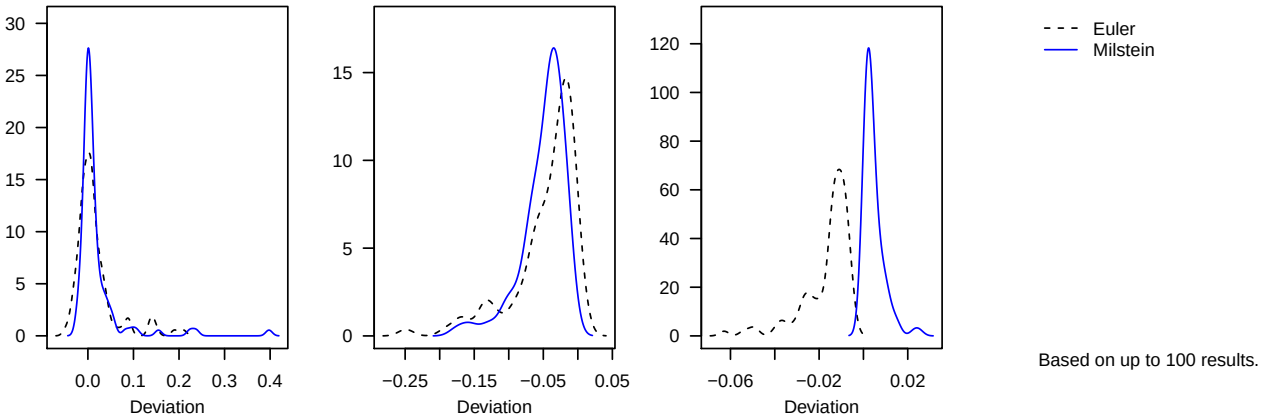


Table 22: RMSE

	beta	sigma2	covariance
Euler	0.048	0.067	0.020
Milstein	0.059	0.060	0.006

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
Euler	23461023	2544849	2422521	329287
Milstein	4685450	123303	480549	40285

Acceptance rates

	ARparam mean	ARparam sd
td_E	0.443	0.015
td_M	0.442	0.015

m = 2

`mean of # of switching to Euler for MB_td_Milstein_pd_Milstein: 0`

`total # of negative proposals:`

DBM_td_M_pd_M	MB_td_E_pd_E	MB_td_M_pd_E	MB_td_M_pd_M
11731	69362	20638	0

`ratio of negative proposals and number of iterations:`

	DBM_td_M_pd_M	MB_td_E_pd_E	MB_td_M_pd_E	MB_td_M_pd_M
min	0.0000000	0.0000000	0.000000	0
max	0.0060738	0.0089184	0.010144	0
median	0.0000000	0.0000000	0.000000	0
mean	0.0000607	0.0000897	0.000102	0

The following sections show density plots of the discrepancy between the respective statistic of the samples from the approximated posteriors (sampled with two-step MCMC) and the sample from the true posterior (sampled with Stan) calculated for the 100 simulated datasets.

Posterior mean

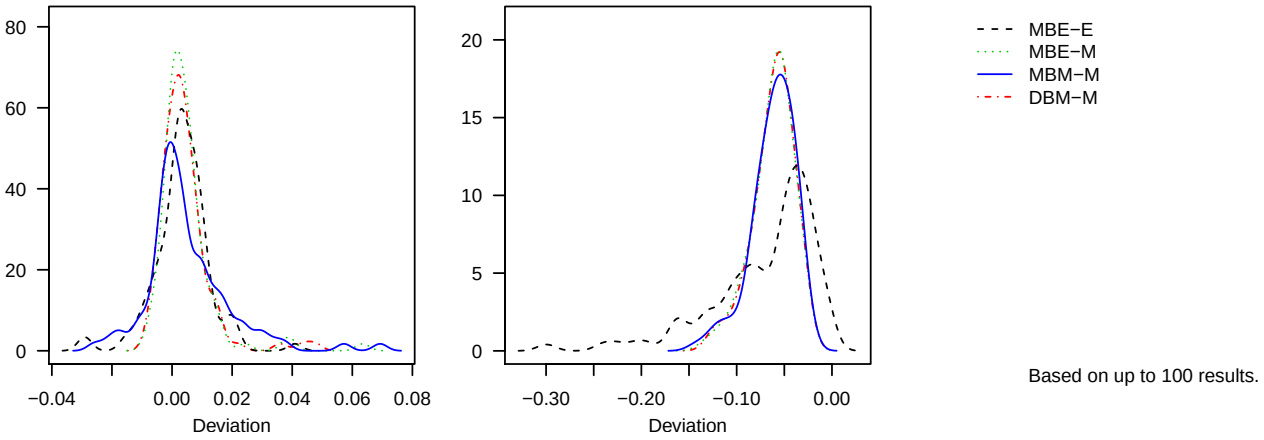


Table 27: RMSE

	beta	sigma2
MBE-E	0.010	0.091
MBE-M	0.010	0.066
MBM-M	0.015	0.066
DBM-M	0.010	0.065

Posterior median

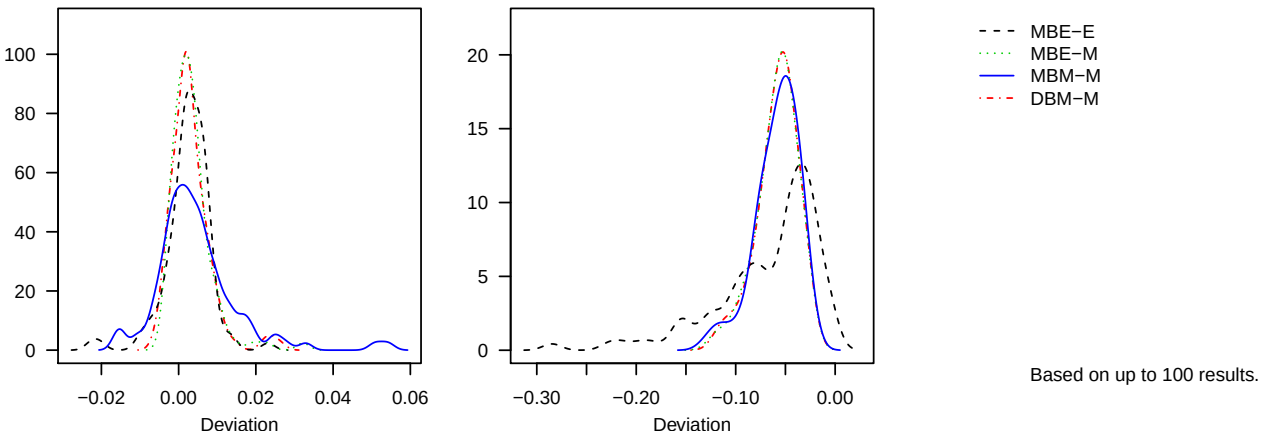


Table 28: RMSE

	beta	sigma2
MBE-E	0.006	0.086
MBE-M	0.006	0.062
MBM-M	0.012	0.062
DBM-M	0.006	0.062

Posterior variance and covariance

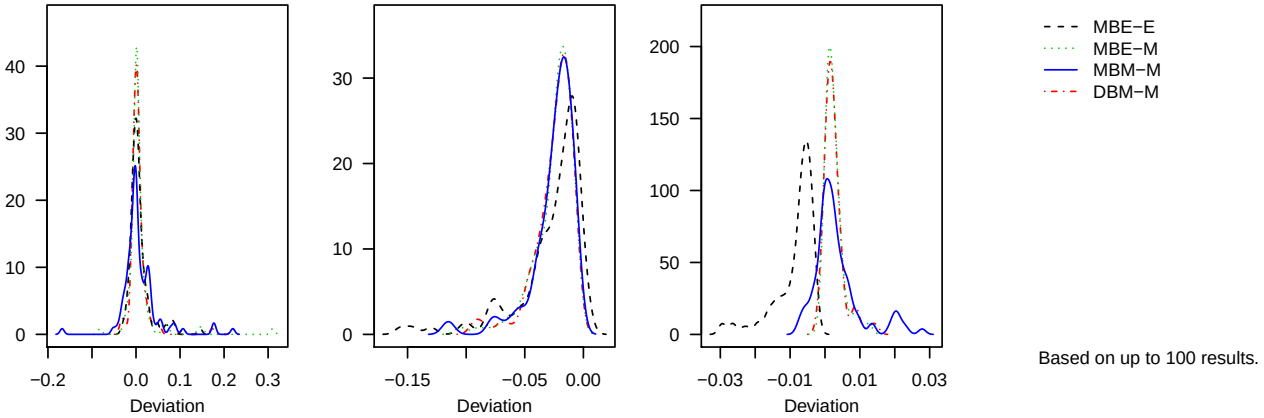


Table 29: RMSE

	beta	sigma2	covariance
MBE-E	0.026	0.042	0.010
MBE-M	0.041	0.031	0.004
MBM-M	0.046	0.033	0.007
DBM-M	0.033	0.031	0.004

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
MBE-E	8482241	508693	422034	40159
MBE-M	1944229	90608	94071	9632
MBM-M	186588	12088	9429	1185
DBM-M	1905354	75891	95262	9820

Acceptance rates

	ARpath mean	ARpath sd	ARparam mean	ARparam sd
MBE-E	0.964	0.010	0.384	0.012
MBE-M	0.957	0.011	0.383	0.013
MBM-M	1.000	0.000	0.383	0.013
DBM-M	0.968	0.008	0.383	0.013

m = 5

`mean of # of switching to Euler for MB_td_Milstein_pd_Milstein: 0`

`total # of negative proposals:`

DBM_td_M_pd_M	MB_td_E_pd_E	MB_td_M_pd_E	MB_td_M_pd_M
861	20863	3157	0

`ratio of negative proposals and number of iterations:`

	DBM_td_M_pd_M	MB_td_E_pd_E	MB_td_M_pd_E	MB_td_M_pd_M
min	0.0000000	0.0000000	0.0000000	0
max	0.0009105	0.0031063	0.0033172	0
median	0.0000000	0.0000000	0.0000000	0
mean	0.0000091	0.0000311	0.0000332	0

The following sections show density plots of the discrepancy between the respective statistic of the samples from the approximated posteriors (sampled with two-step MCMC) and the sample from the true posterior (sampled with Stan) calculated for the 100 simulated datasets.

Posterior mean

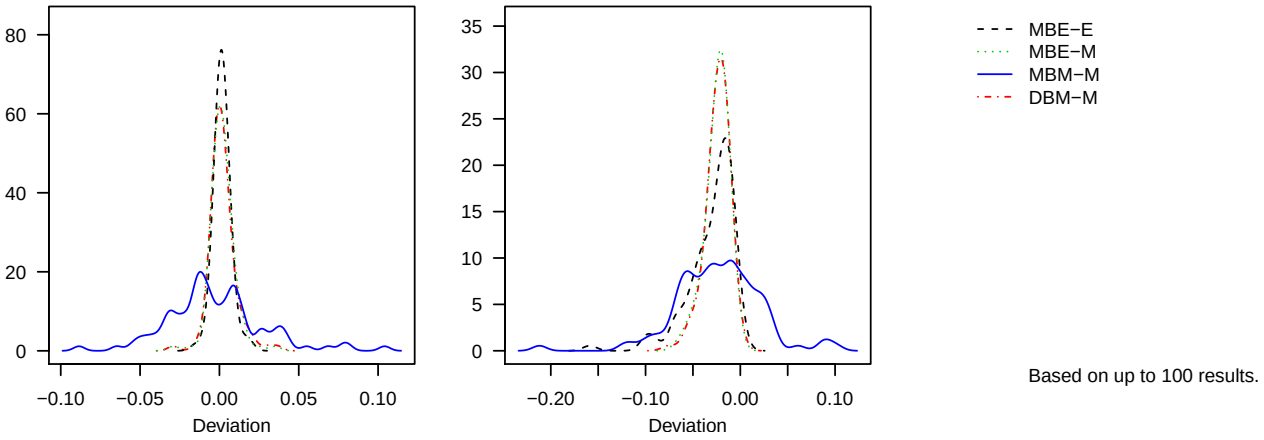


Table 34: RMSE

	beta	sigma2
MBE-E	0.005	0.040
MBE-M	0.008	0.027
MBM-M	0.031	0.051
DBM-M	0.009	0.027

Posterior median

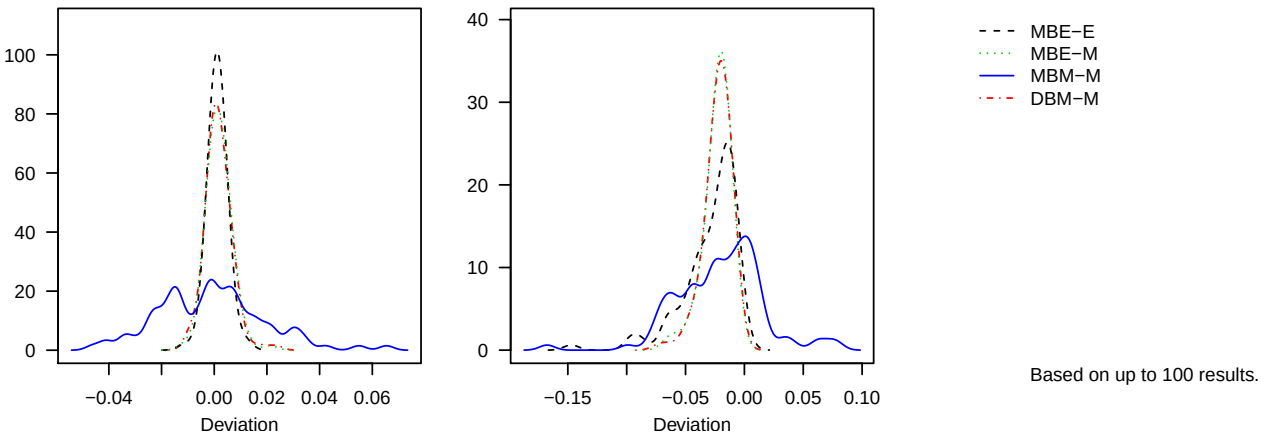


Table 35: RMSE

	beta	sigma2
MBE-E	0.004	0.038
MBE-M	0.005	0.026
MBM-M	0.020	0.042
DBM-M	0.005	0.026

Posterior variance and covariance

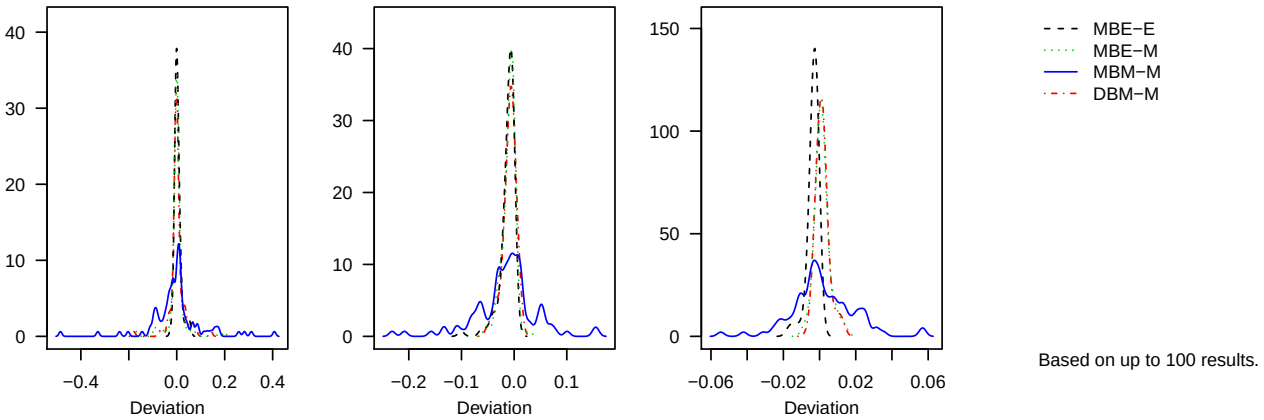


Table 36: RMSE

	beta	sigma2	covariance
MBE-E	0.014	0.019	0.005
MBE-M	0.038	0.016	0.004
MBM-M	0.110	0.061	0.017
DBM-M	0.032	0.016	0.004

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
MBE-E	6851197	310231	114344	11373
MBE-M	966579	41409	15599	2062
MBM-M	37648	4569	574	146
DBM-M	906791	69618	14881	2059

Acceptance rates

	ARpath mean	ARpath sd	ARparam mean	ARparam sd
MBE-E	0.976	0.007	0.272	0.008
MBE-M	0.965	0.009	0.272	0.009
MBM-M	0.993	0.001	0.272	0.009
DBM-M	0.975	0.007	0.272	0.009

	ARpath mean	ARpath sd	ARparam mean	ARparam sd

M = 50

m = 1

The following sections show density plots of the discrepancy between the respective statistic of the samples from the approximated posteriors (sampled with two-step MCMC) and the sample from the true posterior (sampled with Stan) calculated for the 100 simulated datasets.

Posterior mean

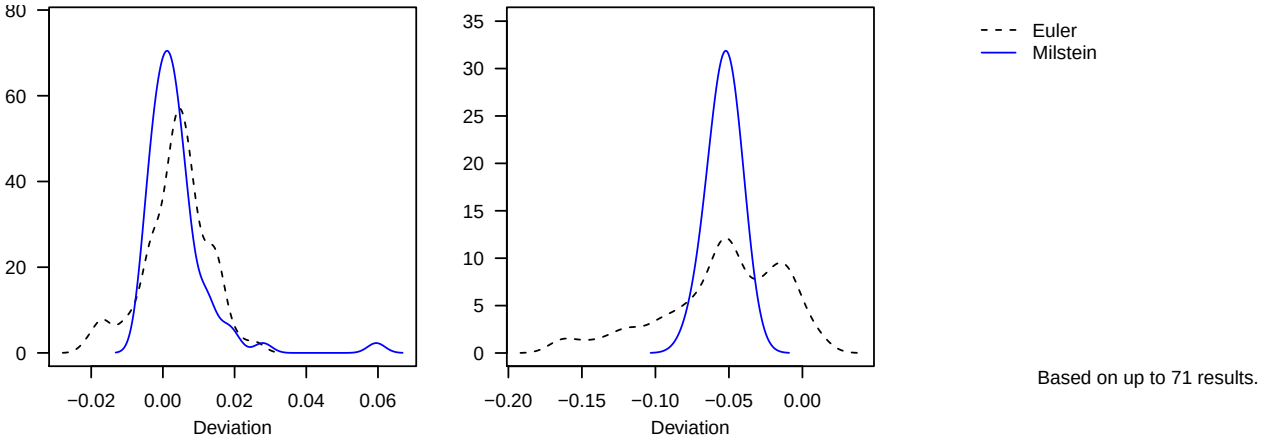


Table 39: RMSE

	beta	sigma2
Euler	0.01	0.068
Milstein	0.01	0.054

Posterior median

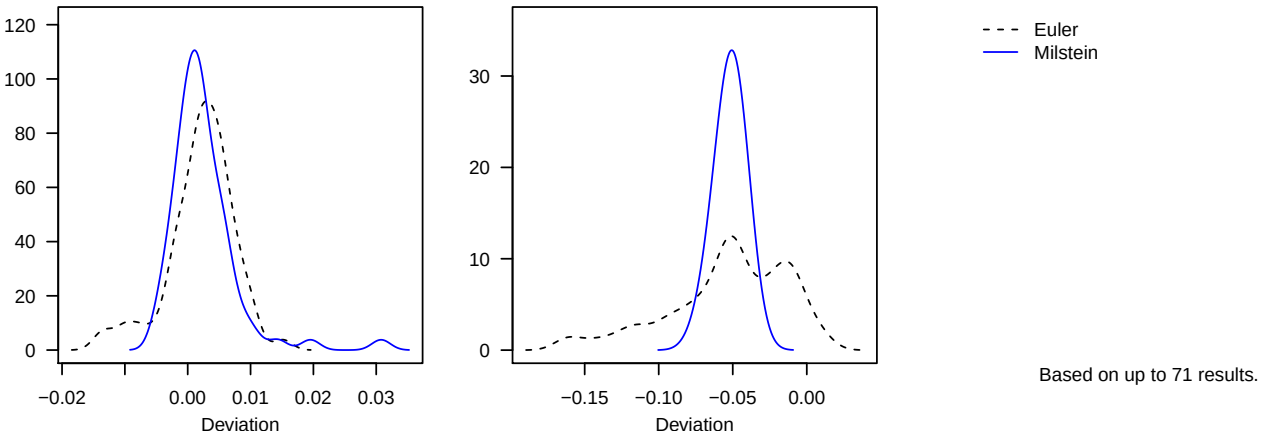


Table 40: RMSE

	beta	sigma2
Euler	0.006	0.067
Milstein	0.006	0.053

Posterior variance and covariance

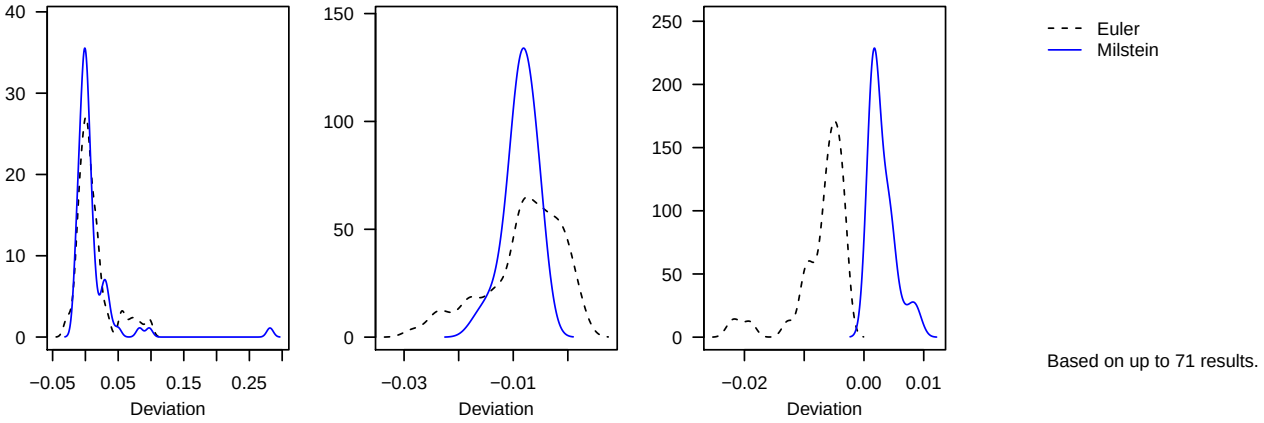


Table 41: RMSE

	beta	sigma2	covariance
Euler	0.030	0.011	0.008
Milstein	0.039	0.009	0.004

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
Euler	23058561	1788749	2232636	243649
Milstein	2218768	146182	213333	22338

Acceptance rates

	ARparam mean	ARparam sd
td_E	0.344	0.011
td_M	0.343	0.011

m = 2

`mean of # of switching to Euler for MB_td_Milstein_pd_Milstein: 0`

`total # of negative proposals:`

DBM_td_M_pd_M	MB_td_E_pd_E	MB_td_M_pd_E	MB_td_M_pd_M
127	3778	588	0

`ratio of negative proposals and number of iterations:`

	DBM_td_M_pd_M	MB_td_E_pd_E	MB_td_M_pd_E	MB_td_M_pd_M
min	0.0000000	0.0000000	0.0000000	0
max	0.0001302	0.0005492	0.0005906	0
median	0.0000000	0.0000000	0.0000000	0
mean	0.0000013	0.0000055	0.0000059	0

The following sections show density plots of the discrepancy between the respective statistic of the samples from the approximated posteriors (sampled with two-step MCMC) and the sample from the true posterior (sampled with Stan) calculated for the 100 simulated datasets.

Posterior mean

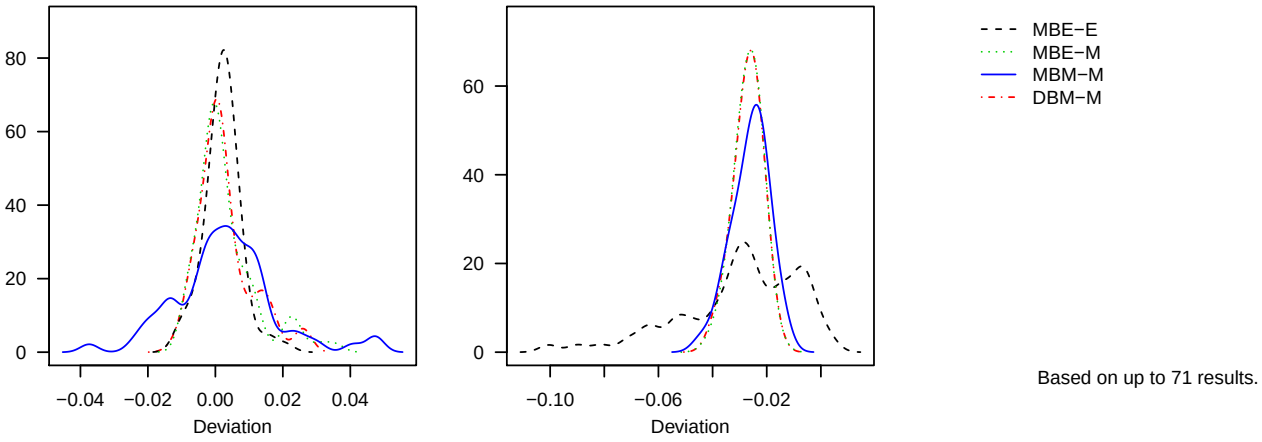


Table 46: RMSE

	beta	sigma2
MBE-E	0.006	0.038
MBE-M	0.010	0.027
MBM-M	0.015	0.027
DBM-M	0.009	0.027

Posterior median

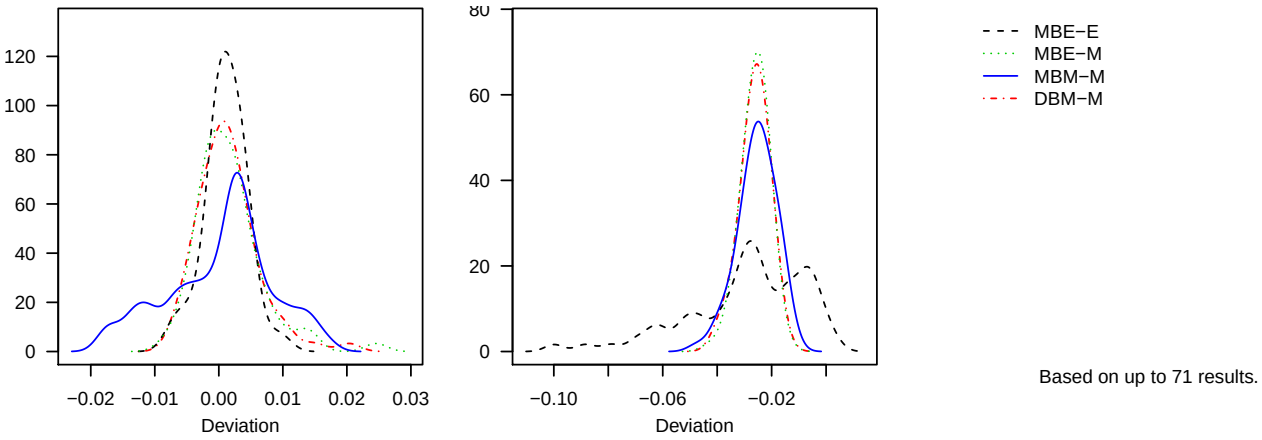


Table 47: RMSE

	beta	sigma2
MBE-E	0.003	0.037
MBE-M	0.006	0.026
MBM-M	0.008	0.026
DBM-M	0.005	0.027

Posterior variance and covariance

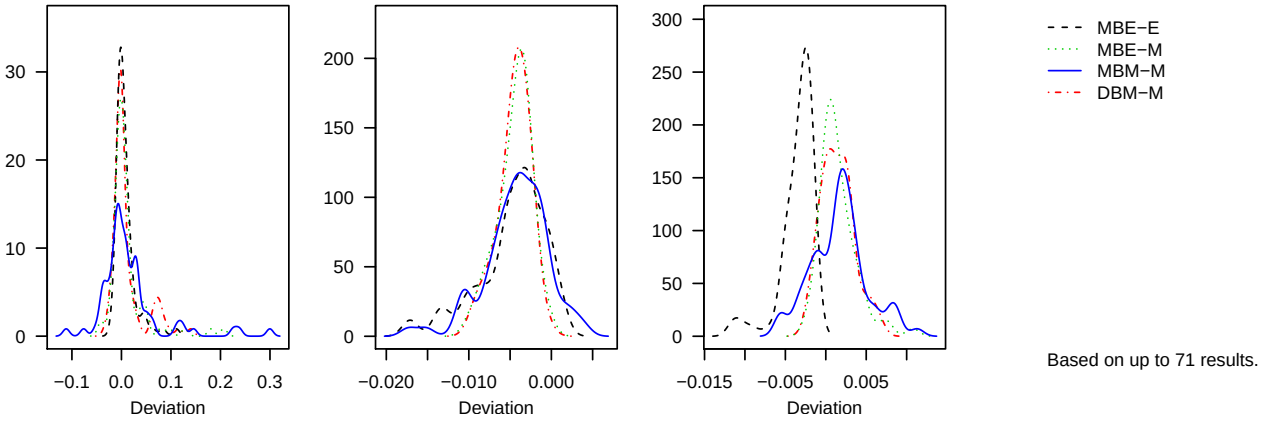


Table 48: RMSE

	beta	sigma2	covariance
MBE-E	0.023	0.006	0.004
MBE-M	0.043	0.005	0.003
MBM-M	0.067	0.006	0.004
DBM-M	0.036	0.005	0.002

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
MBE-E	7772105	382341	238753	23393
MBE-M	946014	49345	28058	3081
MBM-M	167027	7138	5005	656
DBM-M	964354	43633	29219	3190

Acceptance rates

	ARpath mean	ARpath sd	ARparam mean	ARparam sd
MBE-E	0.978	0.005	0.279	0.009
MBE-M	0.973	0.006	0.279	0.009
MBM-M	1.000	0.000	0.279	0.009
DBM-M	0.979	0.005	0.279	0.009

m = 5

`mean of # of switching to Euler for MB_td_Milstein_pd_Milstein: 0`

`total # of negative proposals:`

DBM_td_M_pd_M	MB_td_E_pd_E	MB_td_M_pd_E	MB_td_M_pd_M
2	294	18	0

`ratio of negative proposals and number of iterations:`

	DBM_td_M_pd_M	MB_td_E_pd_E	MB_td_M_pd_E	MB_td_M_pd_M
min	0.0e+00	0.00e+00	0.00e+00	0
max	4.4e-06	4.91e-05	4.14e-05	0
median	0.0e+00	0.00e+00	0.00e+00	0
mean	0.0e+00	5.00e-07	4.00e-07	0

The following sections show density plots of the discrepancy between the respective statistic of the samples from the approximated posteriors (sampled with two-step MCMC) and the sample from the true posterior (sampled with Stan) calculated for the 100 simulated datasets.

Posterior mean

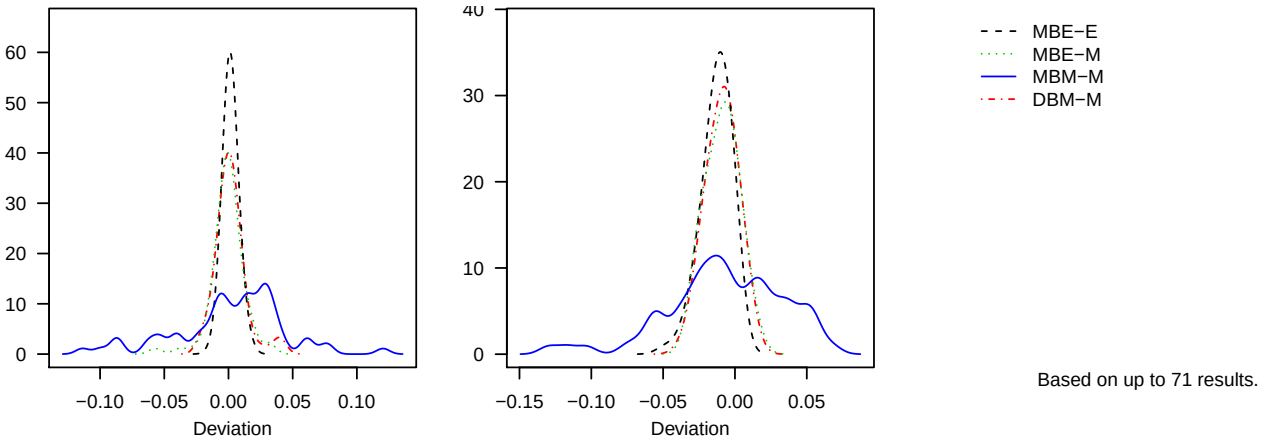
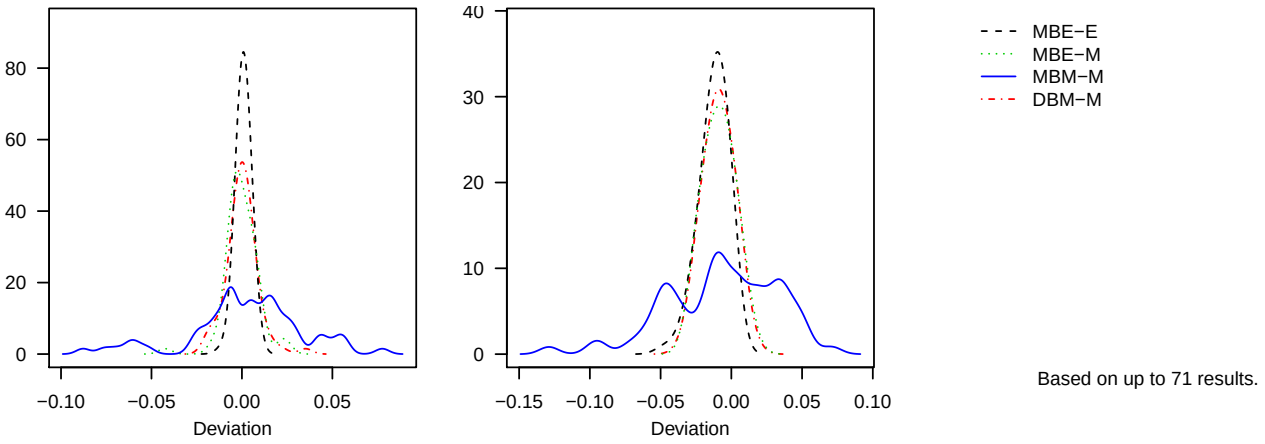


Table 53: RMSE

	beta	sigma2
MBE-E	0.005	0.016
MBE-M	0.013	0.014
MBM-M	0.043	0.041
DBM-M	0.012	0.014

Posterior median

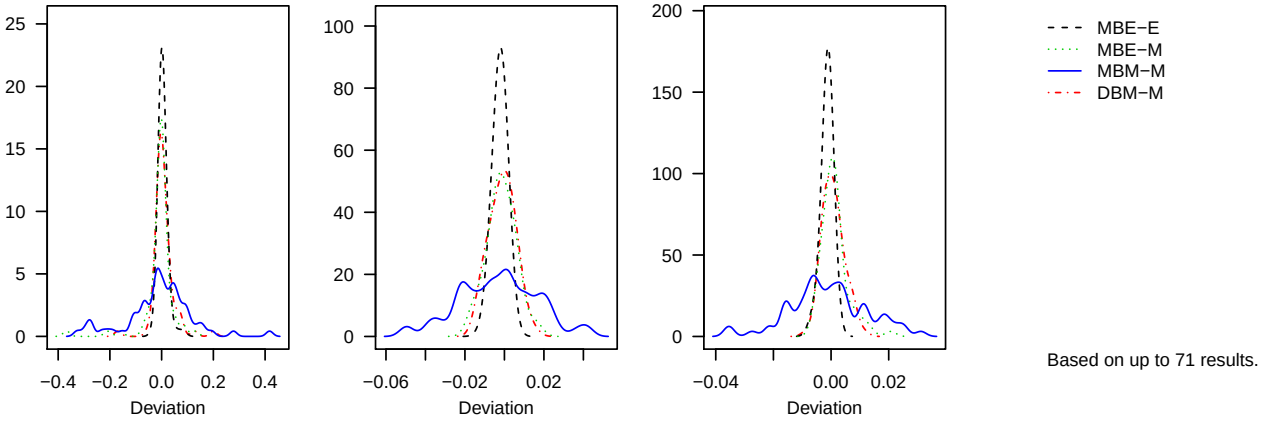


Based on up to 71 results.

Table 54: RMSE

	beta	sigma2
MBE-E	0.003	0.016
MBE-M	0.009	0.014
MBM-M	0.032	0.040
DBM-M	0.009	0.014

Posterior variance and covariance



Based on up to 71 results.

Table 55: RMSE

	beta	sigma2	covariance
MBE-E	0.017	0.003	0.002
MBE-M	0.062	0.007	0.005
MBM-M	0.127	0.020	0.014
DBM-M	0.043	0.006	0.004

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
MBE-E	6004468	339082	52645	6271
MBE-M	439282	20175	3739	601
MBM-M	35401	2836	318	125
DBM-M	435053	30648	3729	611

Acceptance rates

	ARpath mean	ARpath sd	ARparam mean	ARparam sd
MBE-E	0.985	0.004	0.184	0.006
MBE-M	0.978	0.005	0.184	0.006
MBM-M	0.997	0.000	0.184	0.006
DBM-M	0.985	0.004	0.184	0.006

of missing results: 0

Stan results (sampling from and optimizing the true posterior)

M = 10

of missing results: 0

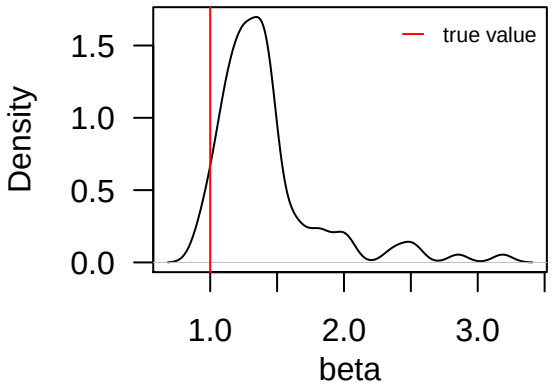
Rhat > 1.01: 0 (out of 200)

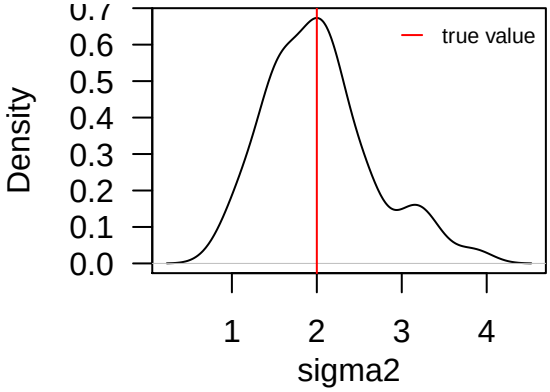
range of max. duration in seconds: (793.2, 4570.7), median: 1833.2

median multivarESS: 5.90989×10^5

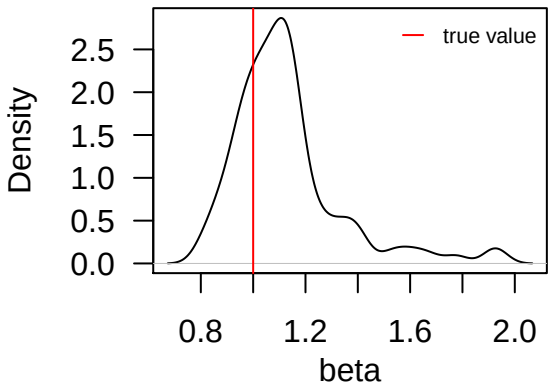
The following sections show density plots of the respective statistic calculated for the 100 simulated datasets.

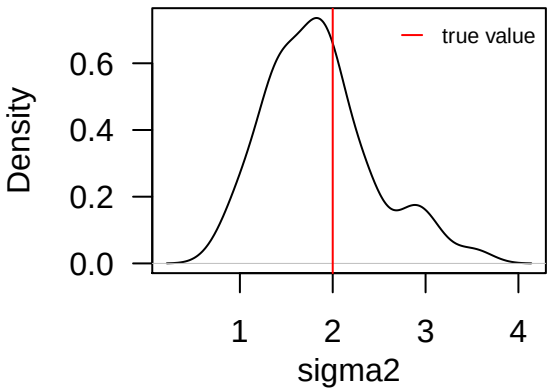
Posterior mean



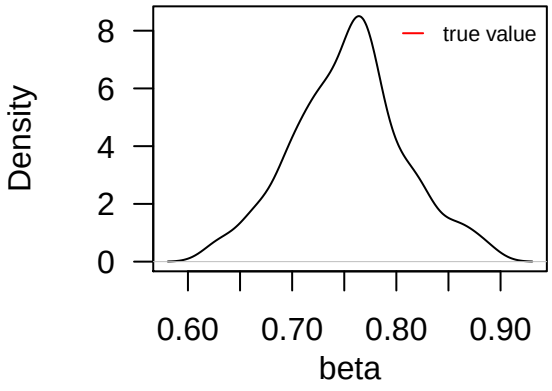


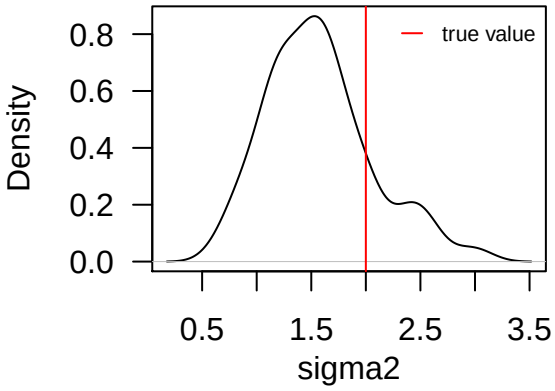
Posterior median



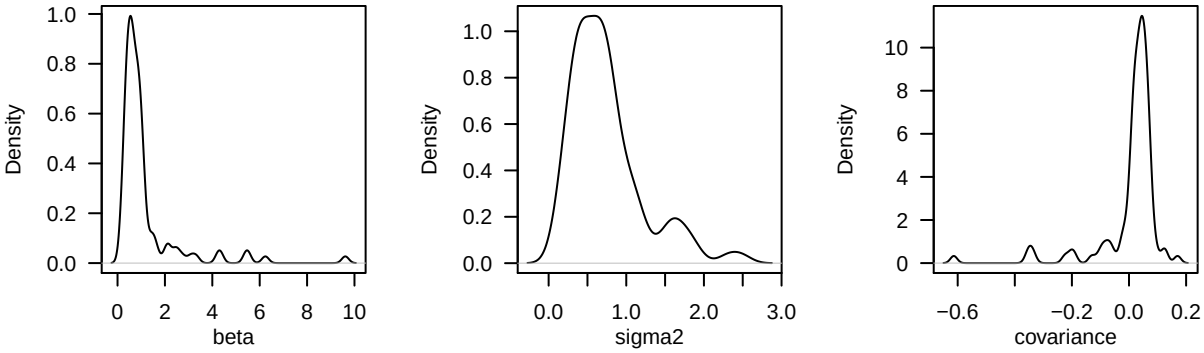


Optimized value

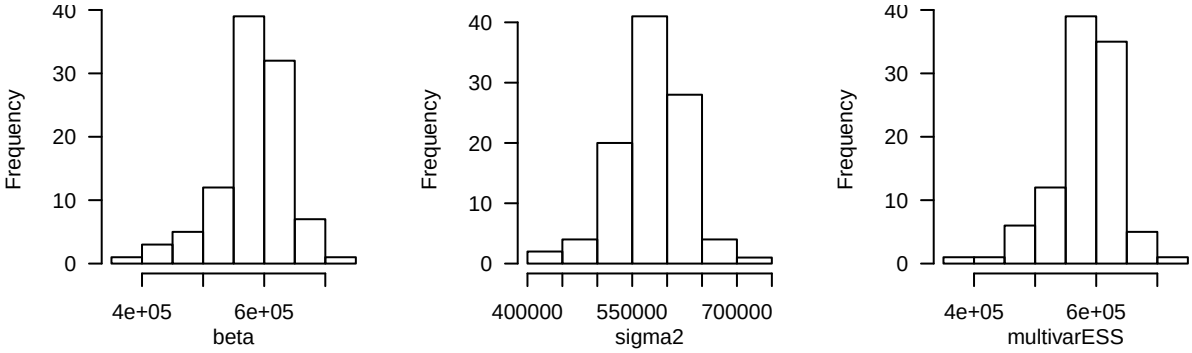




Posterior variance and covariance



Effective sample size



M = 20

of missing results: 0

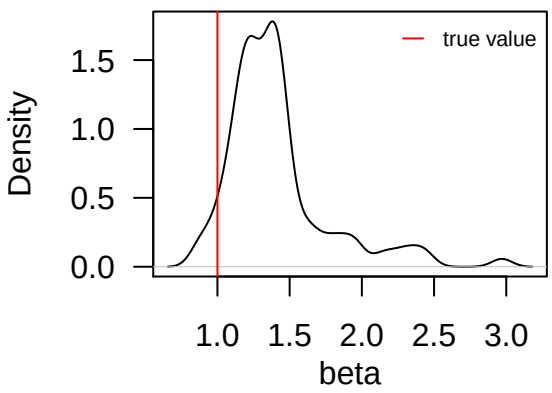
Rhat > 1.01: 0 (out of 200)

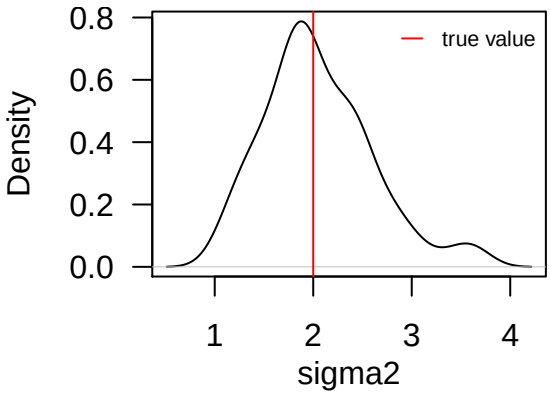
range of max. duration in seconds: $(2356, 1.18526 \times 10^4)$, median: 5842.9

median multivarESS: 6.20173×10^5

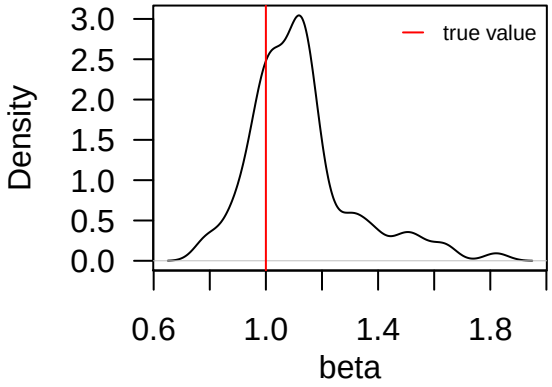
The following sections show density plots of the respective statistic calculated for the 100 simulated datasets.

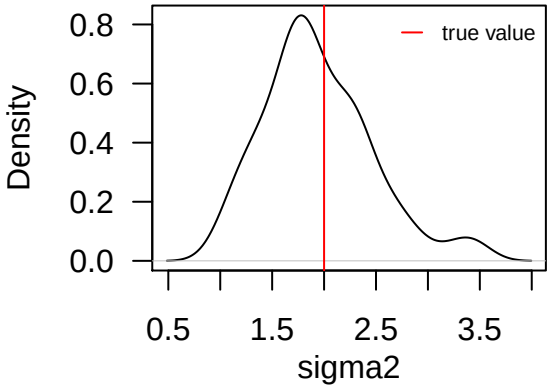
Posterior mean



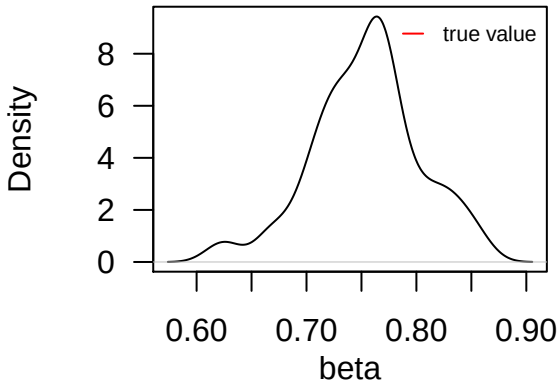


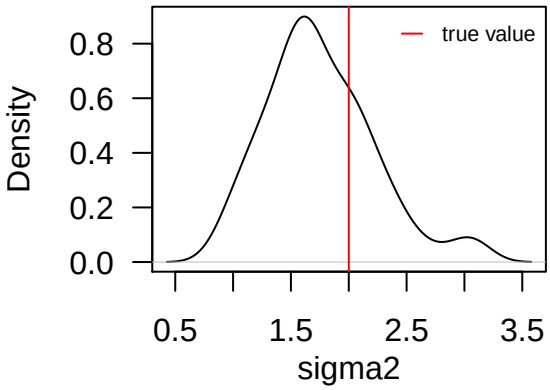
Posterior median



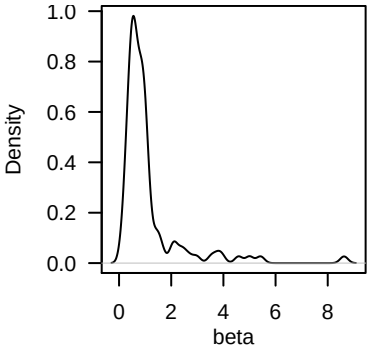


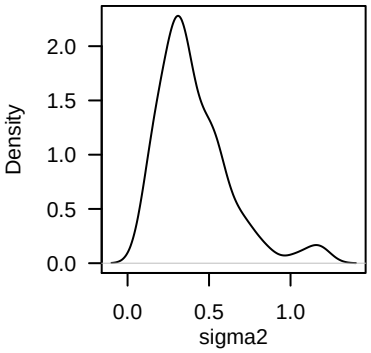
Optimized value

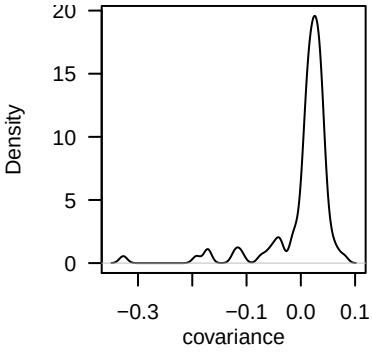




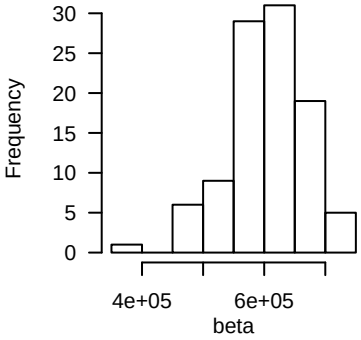
Posterior variance and covariance

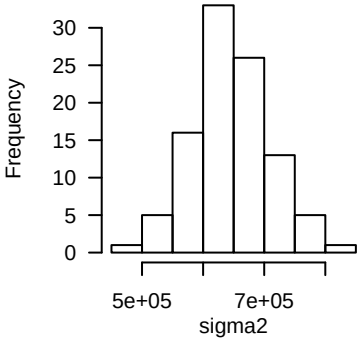


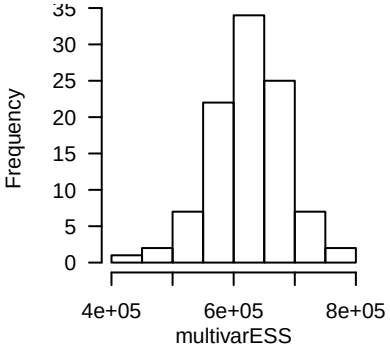




Effective sample size







M = 50

of missing results: 29

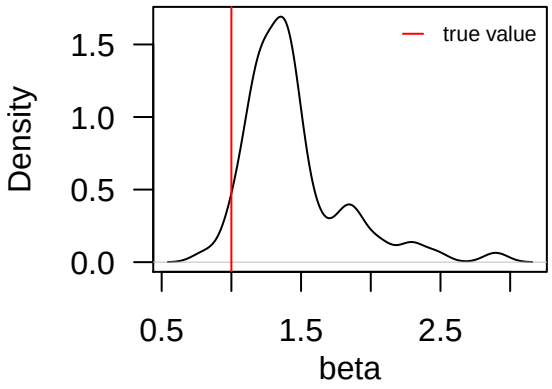
Rhat > 1.01: 0 (out of 200)

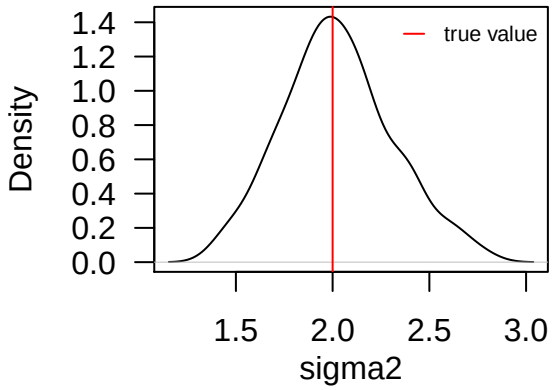
range of max. duration in seconds: $(1.73547 \times 10^4, 7.01274 \times 10^4)$, median: 4.0745×10^4

median multivarESS: 6.56792×10^5

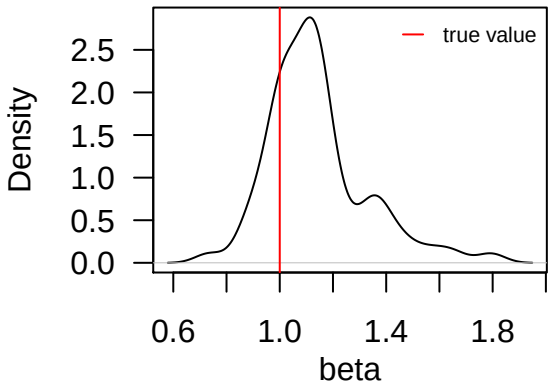
The following sections show density plots of the respective statistic calculated for the 100 simulated datasets.

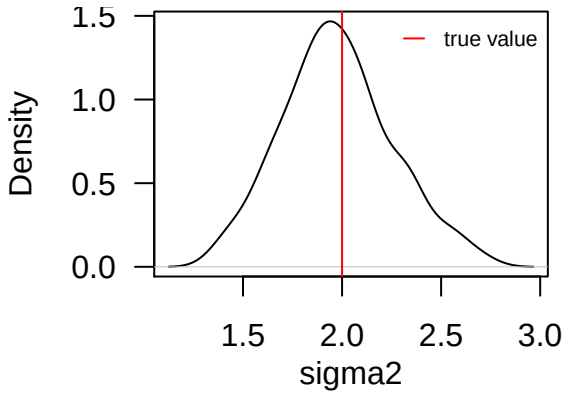
Posterior mean



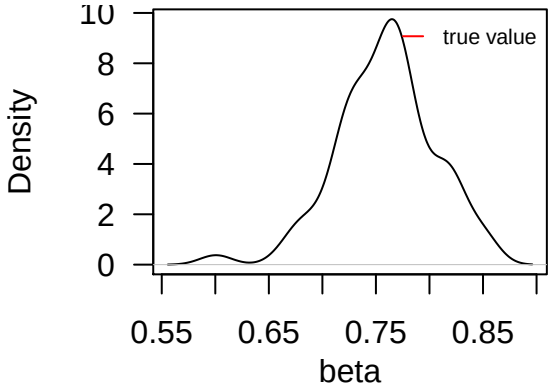


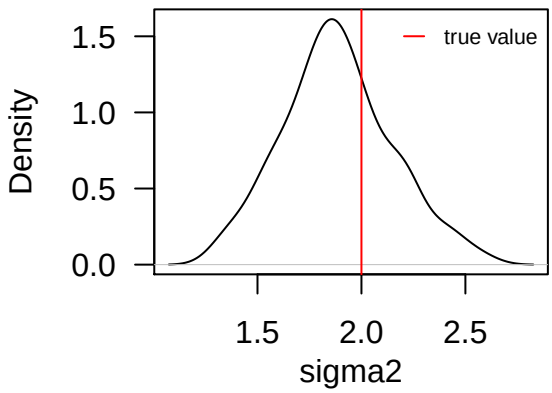
Posterior median



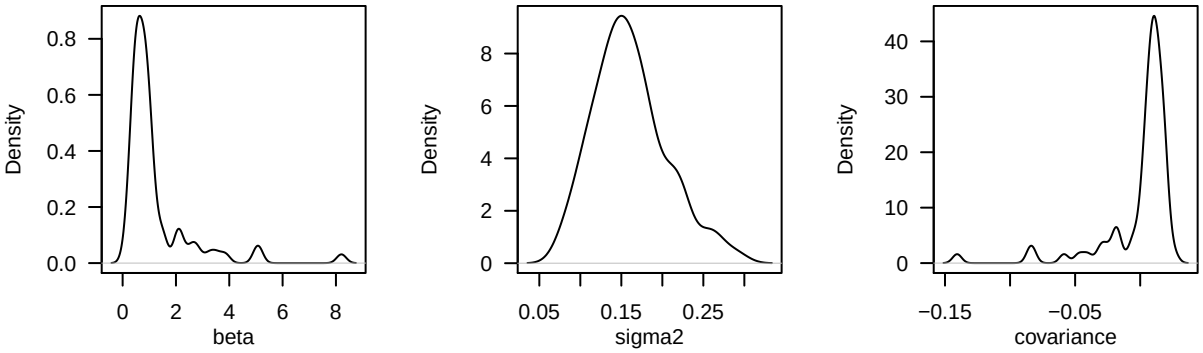


Optimized value

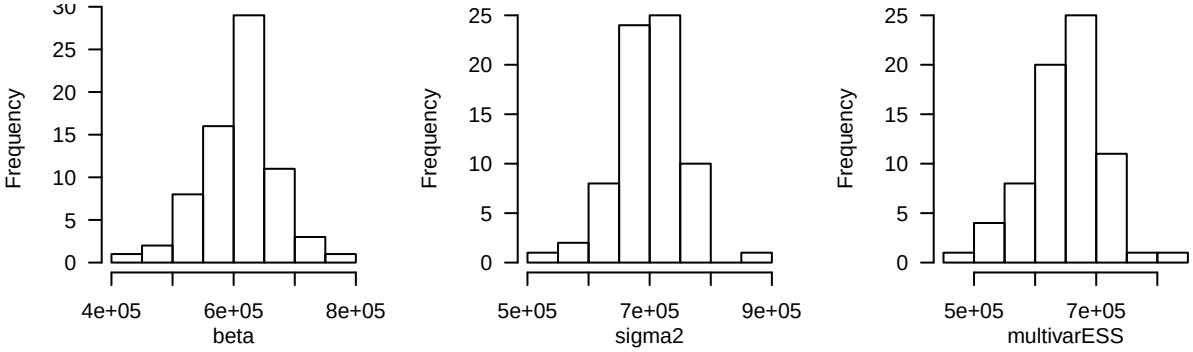




Posterior variance and covariance



Effective sample size



of missing Stan results: 29