Summary of results for CIR_alpha_1_beta_1_sigma_0.25_x0_3

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

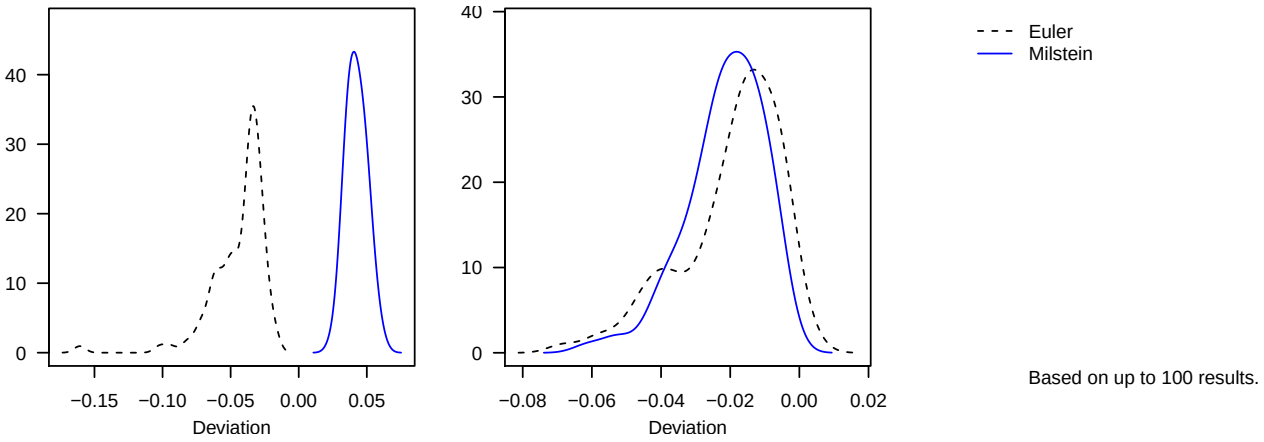


Table 1: RMSE

	beta	sigma2
Euler	0.049	0.025
Milstein	0.043	0.024

Posterior median

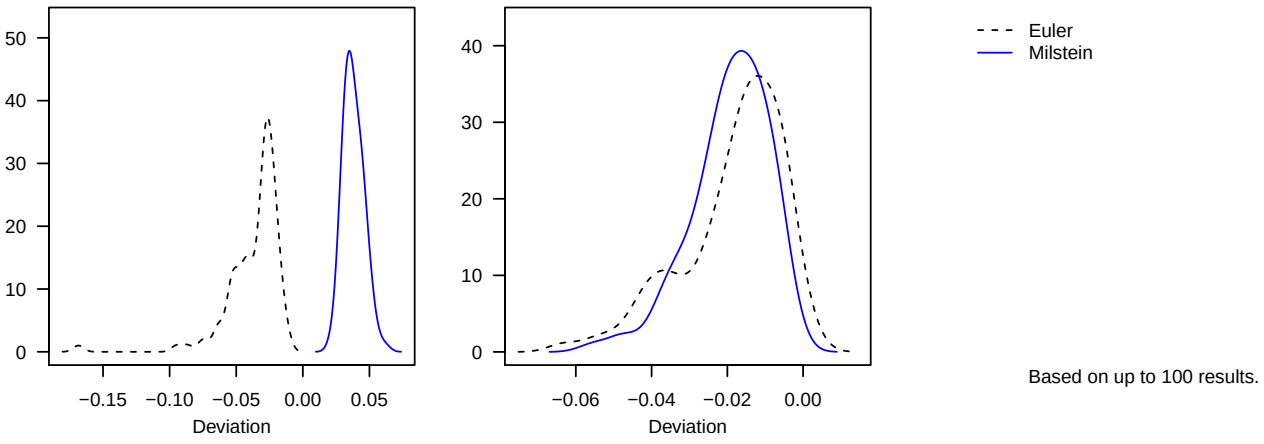


Table 2: RMSE

	beta	sigma2
Euler	0.042	0.023
Milstein	0.039	0.022

Posterior variance and covariance

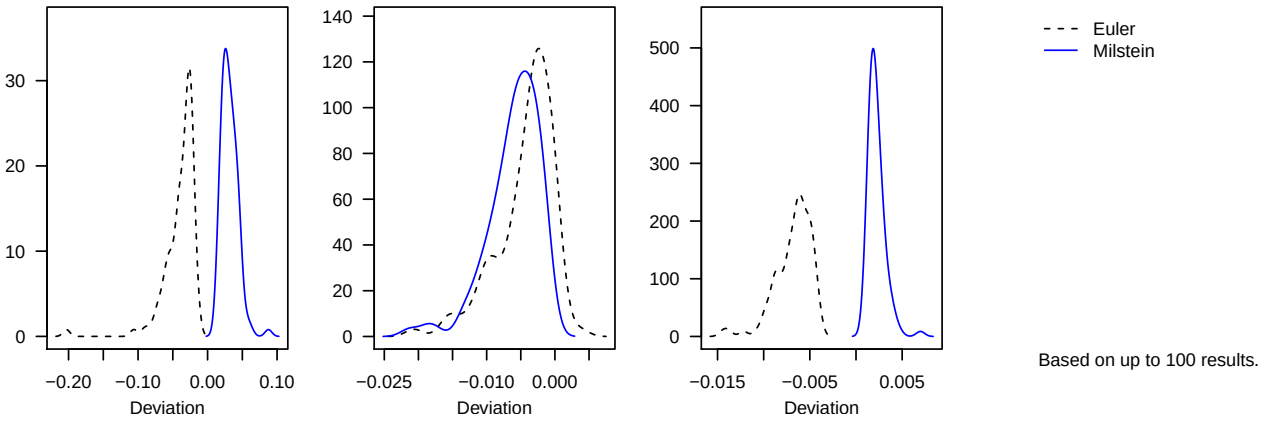


Table 3: RMSE

	beta	sigma2	covariance
Euler	0.047	0.006	0.007
Milstein	0.034	0.007	0.002

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
Euler	25526341	1420153	2800847	178293
Milstein	7701884	519918	839945	61821

Acceptance rates

	ARparam mean	ARparam sd
td_E	0.481	0.01
td_M	0.484	0.01

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
0	19	2	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	0e+00	0
max	0	5e-07	3e-07	0
median	0	0e+00	0e+00	0
mean	0	0e+00	0e+00	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

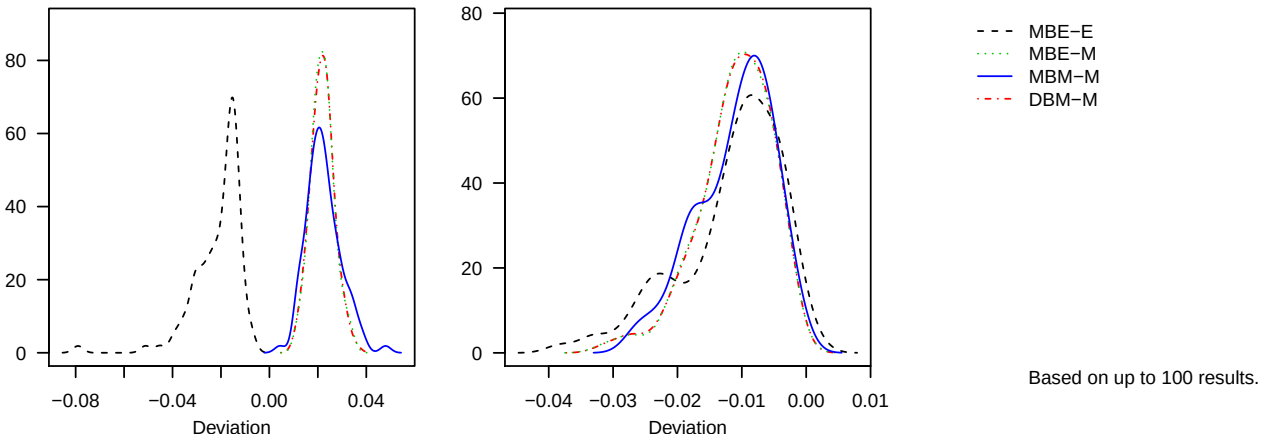


Table 8: RMSE

	beta	sigma2
MBE-E	0.024	0.014
MBE-M	0.022	0.012
MBM-M	0.023	0.013
DBM-M	0.022	0.012

Posterior median

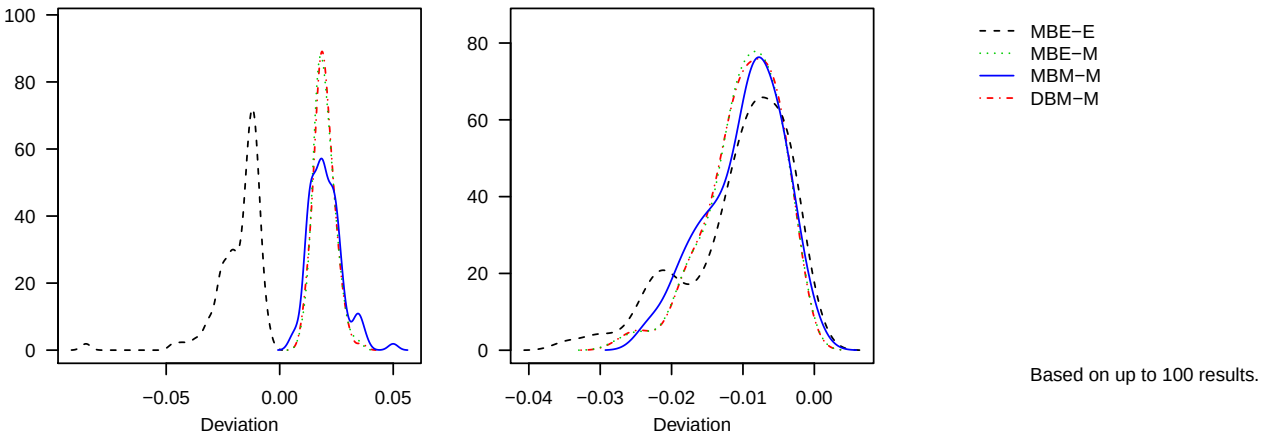


Table 9: RMSE

	beta	sigma2
MBE-E	0.021	0.013
MBE-M	0.020	0.011
MBM-M	0.021	0.011
DBM-M	0.020	0.011

Posterior variance and covariance

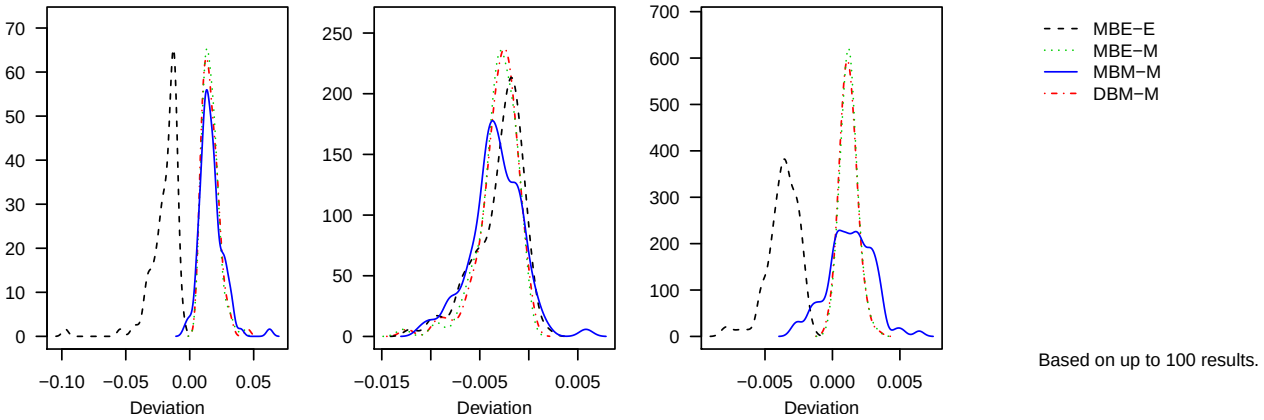


Table 10: RMSE

	beta	sigma2	covariance
MBE-E	0.023	0.004	0.004
MBE-M	0.017	0.004	0.001
MBM-M	0.019	0.004	0.002
DBM-M	0.017	0.004	0.001

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
MBE-E	8703286	405038	620479	34308
MBE-M	2928042	110520	202089	10295
MBM-M	208360	12831	14837	1266
DBM-M	2827604	101161	203710	10969

Acceptance rates

	ARpath mean	ARpath sd	ARparam mean	ARparam sd
MBE-E	0.960	0.005	0.439	0.009
MBE-M	0.956	0.005	0.440	0.009
MBM-M	1.000	0.000	0.440	0.009
DBM-M	0.972	0.005	0.440	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
0	1	0	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	0
max	0	2e-07	0	0
median	0	0e+00	0	0
mean	0	0e+00	0	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

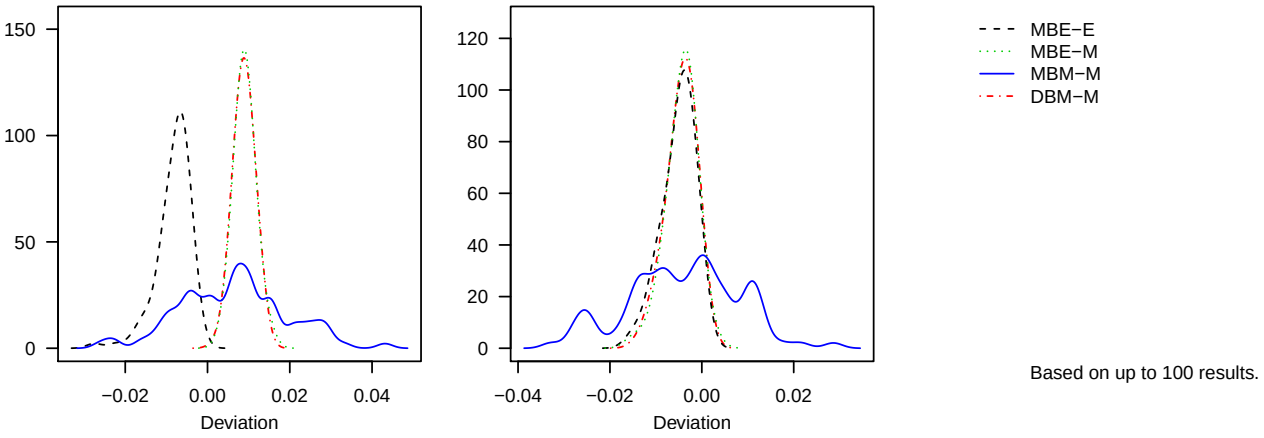


Table 15: RMSE

	beta	sigma2
MBE-E	0.009	0.006
MBE-M	0.009	0.005
MBM-M	0.014	0.013
DBM-M	0.009	0.005

Posterior median

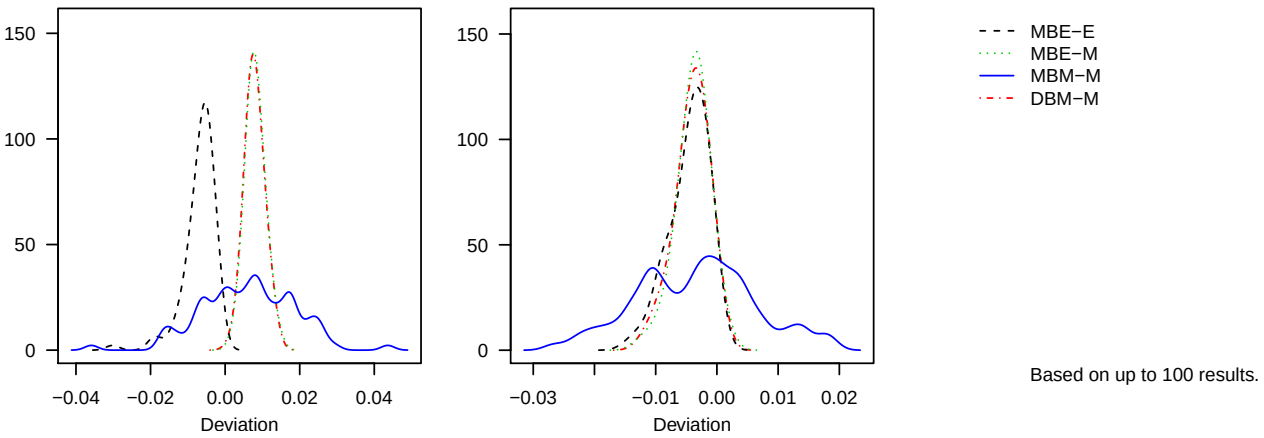


Table 16: RMSE

	beta	sigma2
MBE-E	0.008	0.006
MBE-M	0.008	0.005
MBM-M	0.014	0.010
DBM-M	0.008	0.005

Posterior variance and covariance

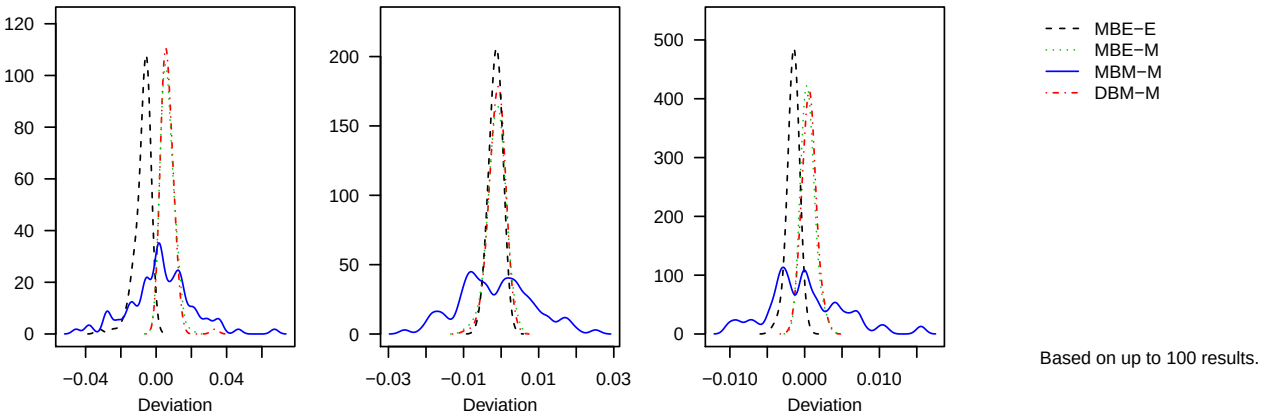


Table 17: RMSE

	beta	sigma2	covariance
MBE-E	0.009	0.002	0.002
MBE-M	0.007	0.003	0.001
MBM-M	0.018	0.010	0.005
DBM-M	0.008	0.002	0.001

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
MBE-E	6985100	265716	207675	11536
MBE-M	1590029	52271	45518	2850
MBM-M	39749	2797	1092	193
DBM-M	1556197	37966	45555	2561

Acceptance rates

	ARpath mean	ARpath sd	ARparam mean	ARparam sd
MBE-E	0.972	0.003	0.336	0.007
MBE-M	0.959	0.004	0.336	0.007
MBM-M	0.991	0.001	0.336	0.008
DBM-M	0.973	0.003	0.336	0.007

	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

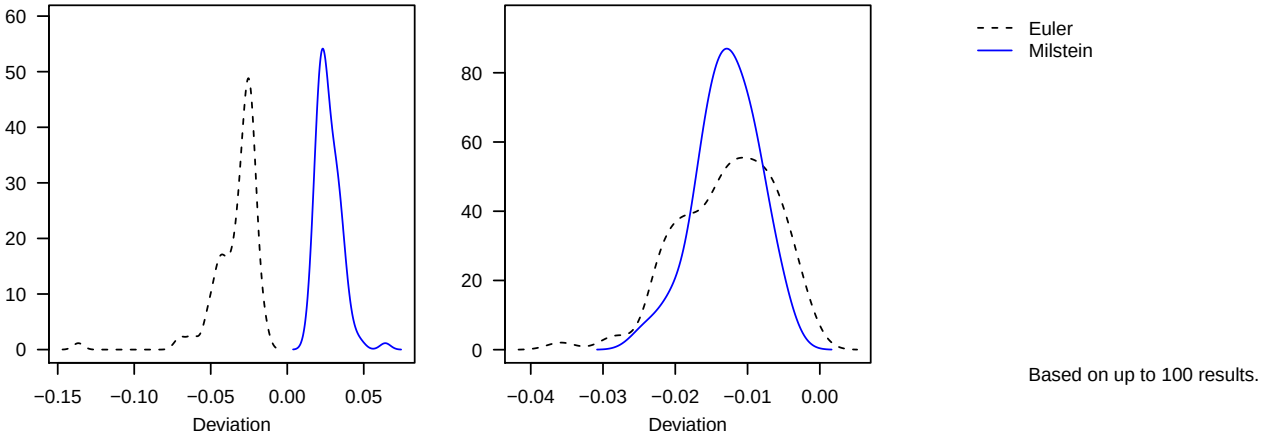


Table 20: RMSE

	beta	sigma2
Euler	0.037	0.014
Milstein	0.028	0.014

Posterior median

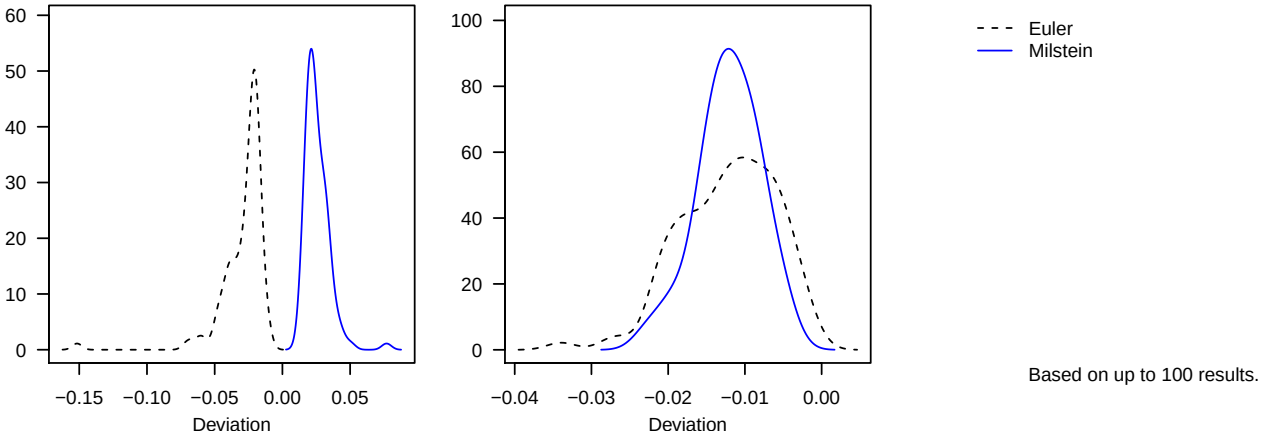


Table 21: RMSE

	beta	sigma2
Euler	0.034	0.014
Milstein	0.027	0.013

Posterior variance and covariance

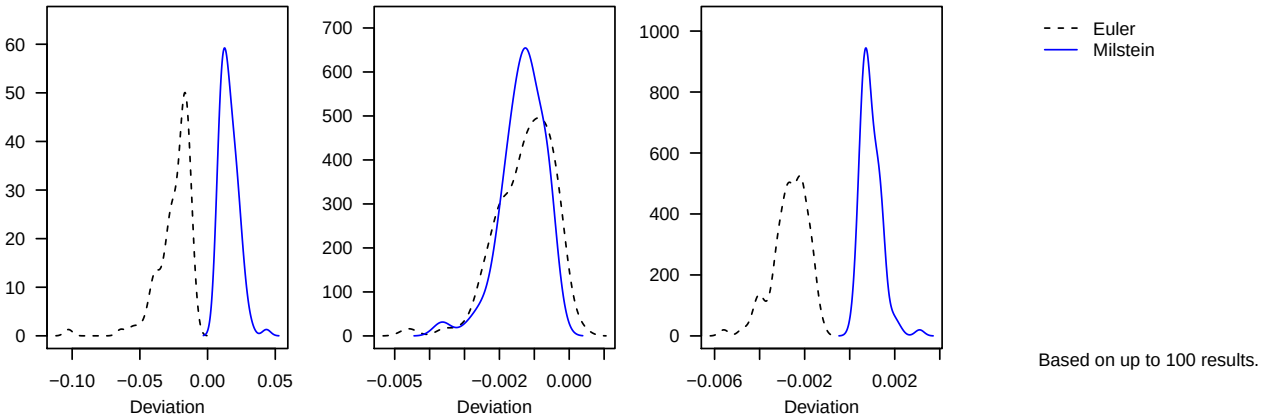


Table 22: RMSE

	beta	sigma2	covariance
Euler	0.028	0.001	0.003
Milstein	0.017	0.001	0.001

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
Euler	24235310	873174	2875908	134151
Milstein	4710795	133551	551467	23891

Acceptance rates

	ARparam mean	ARparam sd
td_E	0.419	0.009
td_M	0.420	0.009

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
0	0	0	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

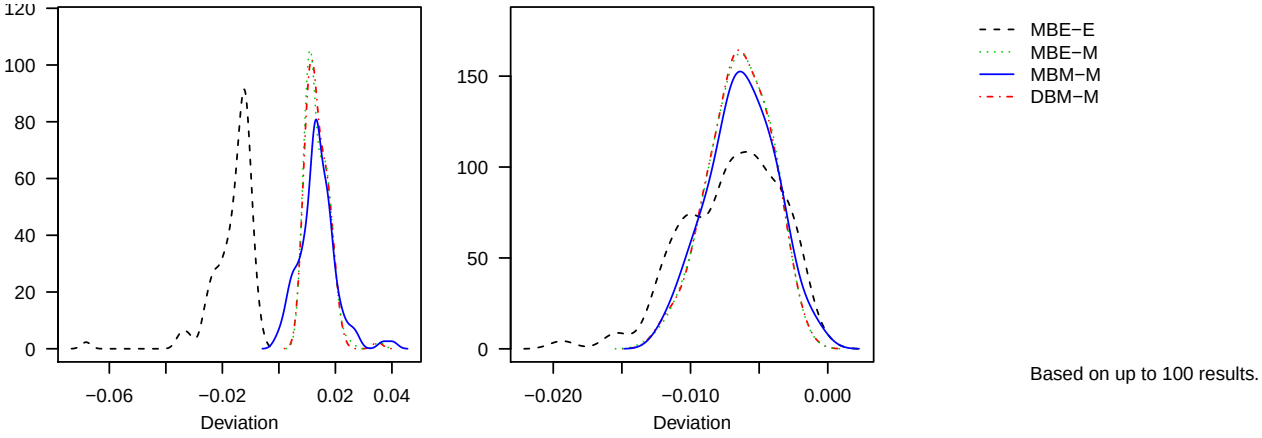


Table 26: RMSE

	beta	sigma2
MBE-E	0.018	0.008
MBE-M	0.014	0.007
MBM-M	0.015	0.007
DBM-M	0.014	0.007

Posterior median

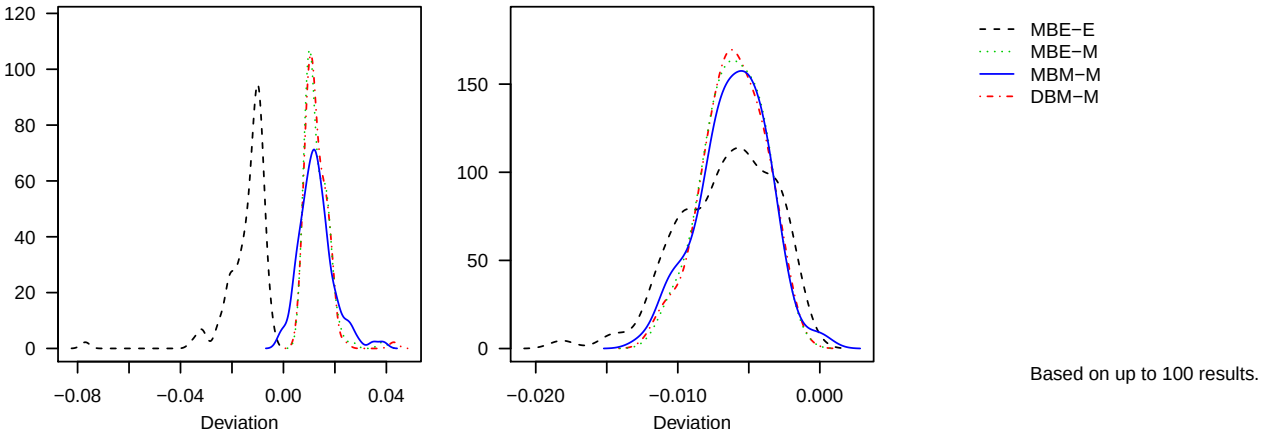


Table 27: RMSE

	beta	sigma2
MBE-E	0.017	0.007
MBE-M	0.014	0.006
MBM-M	0.014	0.007
DBM-M	0.014	0.006

Posterior variance and covariance

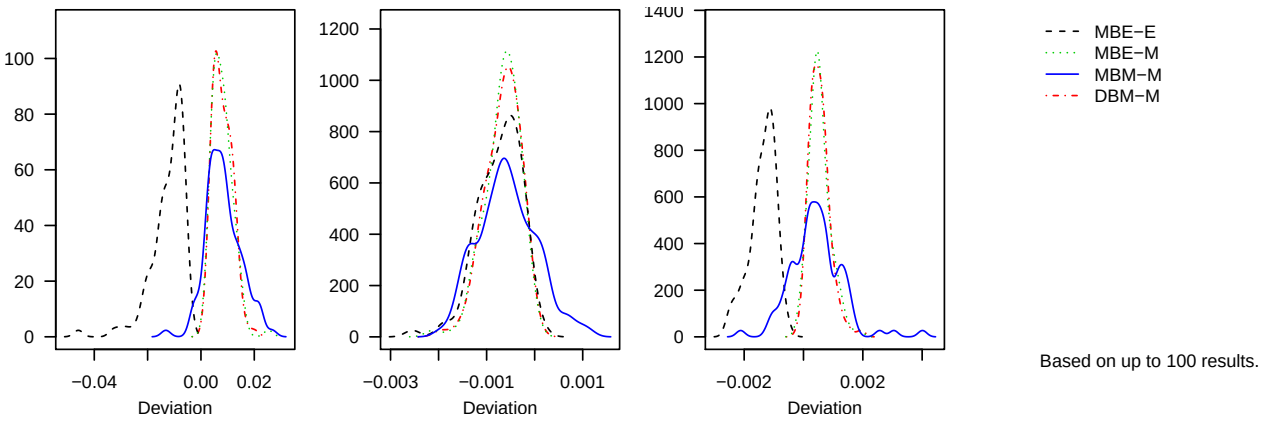


Table 28: RMSE

	beta	sigma2	covariance
MBE-E	0.014	0.001	0.001
MBE-M	0.009	0.001	0.001
MBM-M	0.011	0.001	0.001
DBM-M	0.009	0.001	0.001

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
MBE-E	8463062	287951	492772	23810
MBE-M	1935561	43285	109873	5009
MBM-M	179130	6669	10264	736
DBM-M	1883743	43523	109705	4979

Acceptance rates

	ARpath mean	ARpath sd	ARparam mean	ARparam sd
MBE-E	0.975	0.003	0.363	0.008
MBE-M	0.972	0.003	0.364	0.007
MBM-M	1.000	0.000	0.364	0.007
DBM-M	0.981	0.003	0.364	0.007

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
0	0	0	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

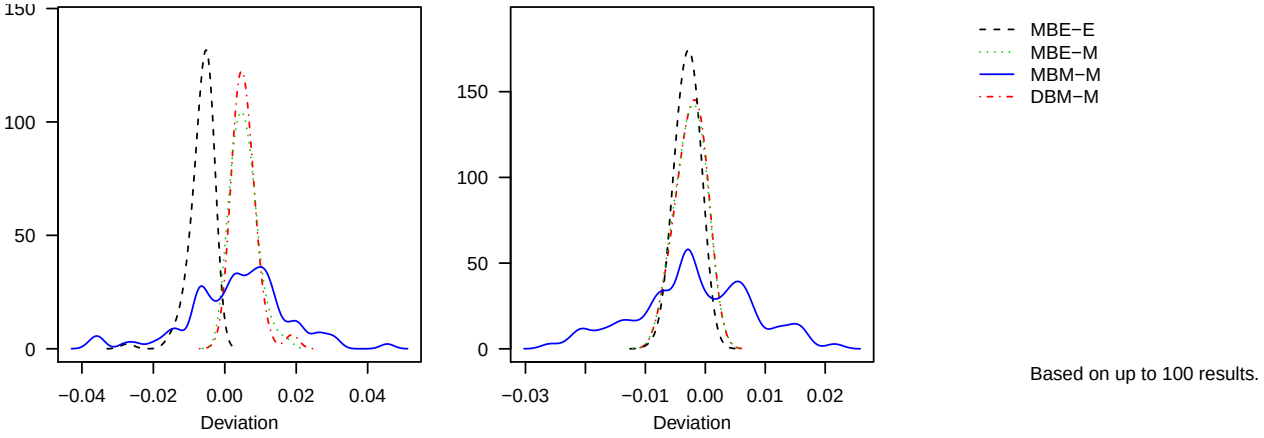


Table 32: RMSE

	beta	sigma2
MBE-E	0.007	0.003
MBE-M	0.006	0.003
MBM-M	0.015	0.010
DBM-M	0.006	0.003

Posterior median

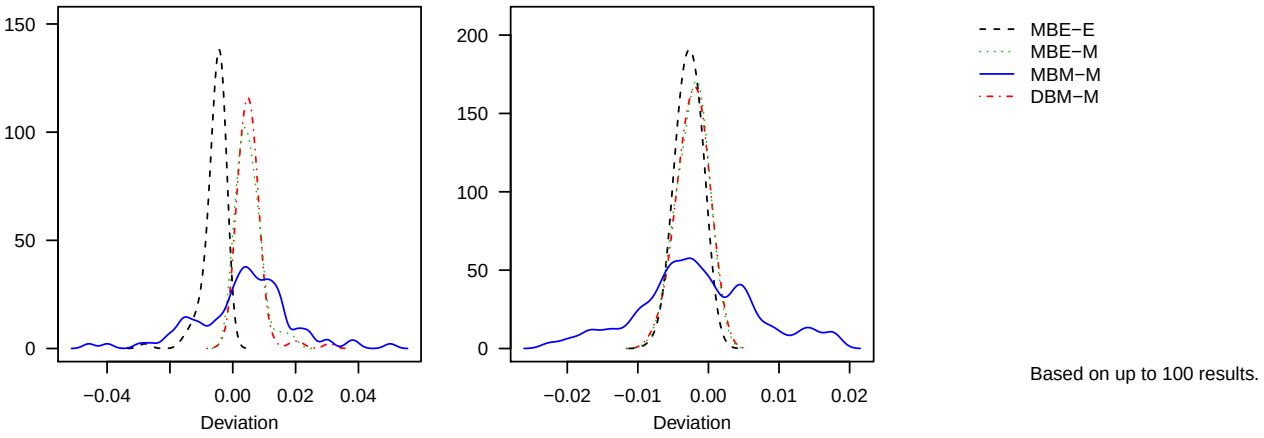


Table 33: RMSE

	beta	sigma2
MBE-E	0.007	0.003
MBE-M	0.007	0.003
MBM-M	0.016	0.009
DBM-M	0.007	0.003

Posterior variance and covariance

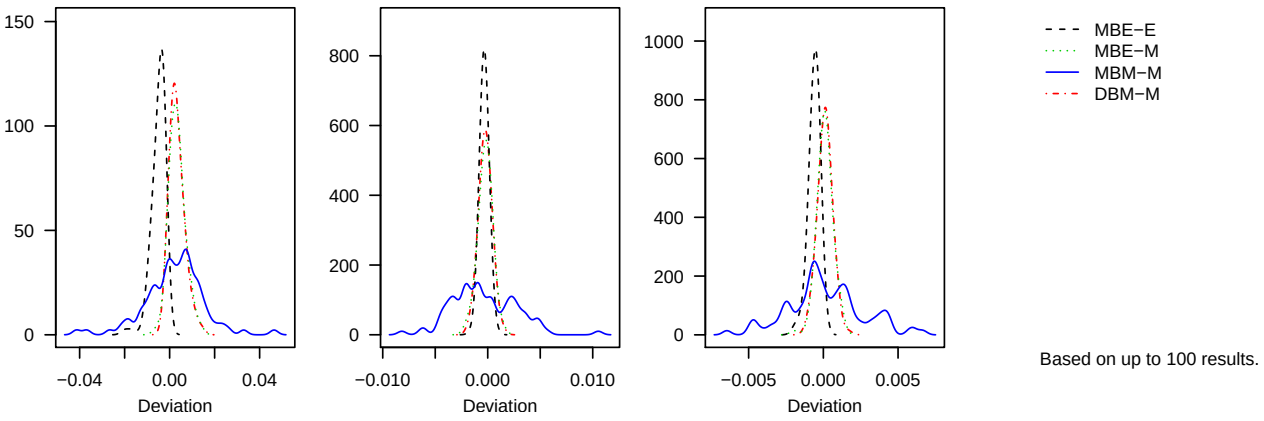


Table 34: RMSE

	beta	sigma2	covariance
MBE-E	0.006	0.000	0.001
MBE-M	0.005	0.001	0.001
MBM-M	0.013	0.003	0.002
DBM-M	0.005	0.001	0.000

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
MBE-E	6758898	174695	130635	6279
MBE-M	950894	22130	17775	1232
MBM-M	37288	1714	662	98
DBM-M	934422	19399	17770	1377

Acceptance rates

	ARpath mean	ARpath sd	ARparam mean	ARparam sd
MBE-E	0.983	0.002	0.258	0.005
MBE-M	0.975	0.003	0.258	0.005
MBM-M	0.995	0.000	0.258	0.006
DBM-M	0.983	0.002	0.258	0.005

	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

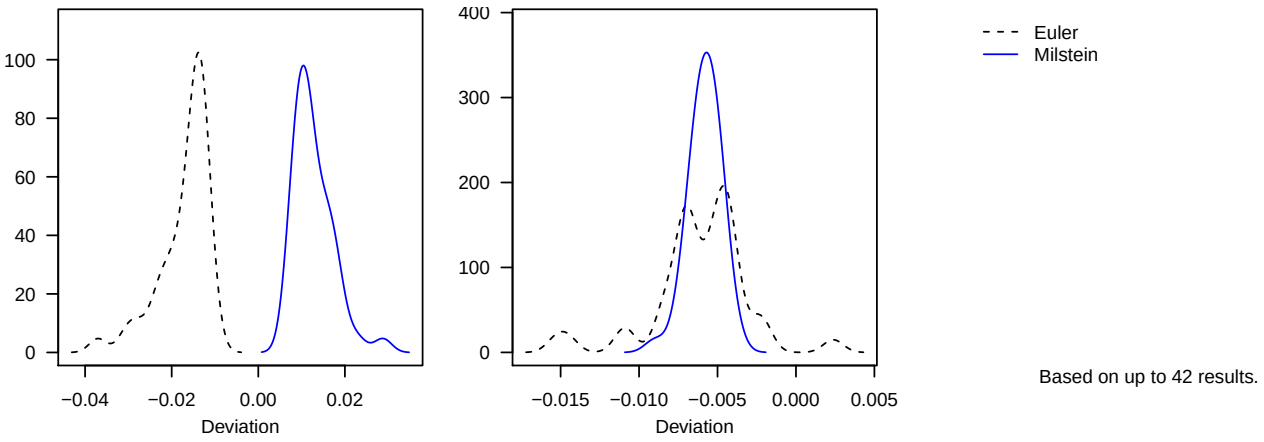


Table 37: RMSE

	beta	sigma2
Euler	0.018	0.007
Milstein	0.014	0.006

Posterior median

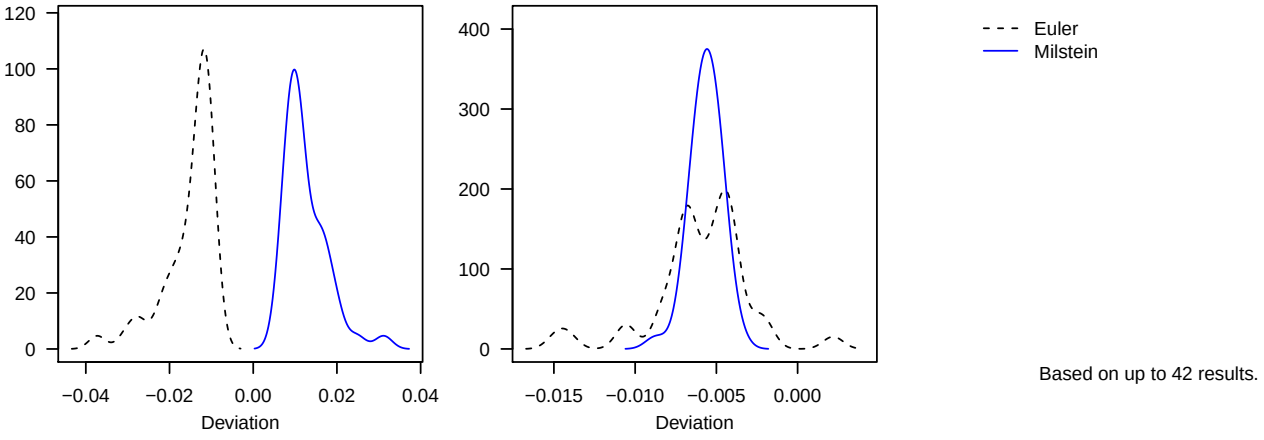


Table 38: RMSE

	beta	sigma2
Euler	0.017	0.007
Milstein	0.014	0.006

Posterior variance and covariance

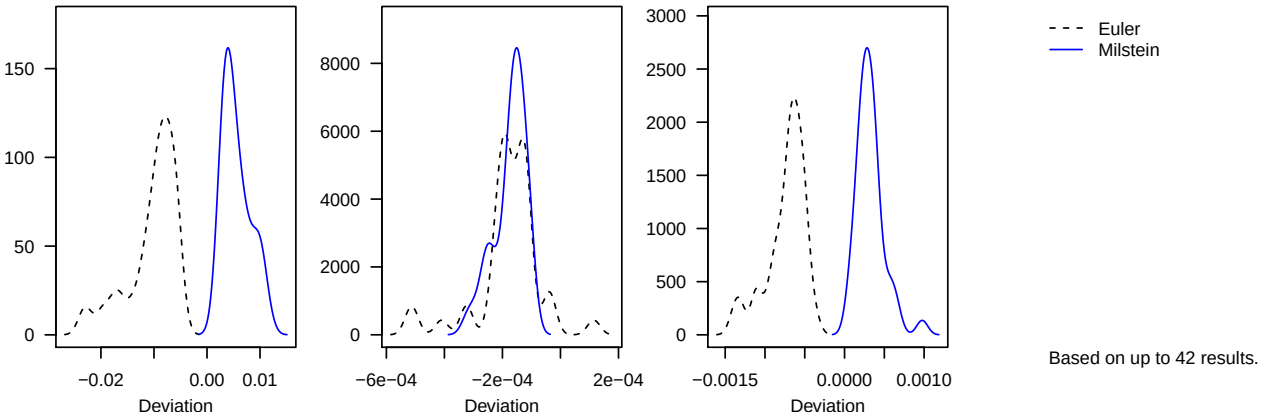


Table 39: RMSE

	beta	sigma2	covariance
Euler	0.011	0	0.001
Milstein	0.006	0	0.000

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
Euler	22636393	606150	2564921	98128
Milstein	2151260	55226	240572	10524

Acceptance rates

	ARparam mean	ARparam sd
td_E	0.320	0.007
td_M	0.321	0.006

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
0	0	0	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

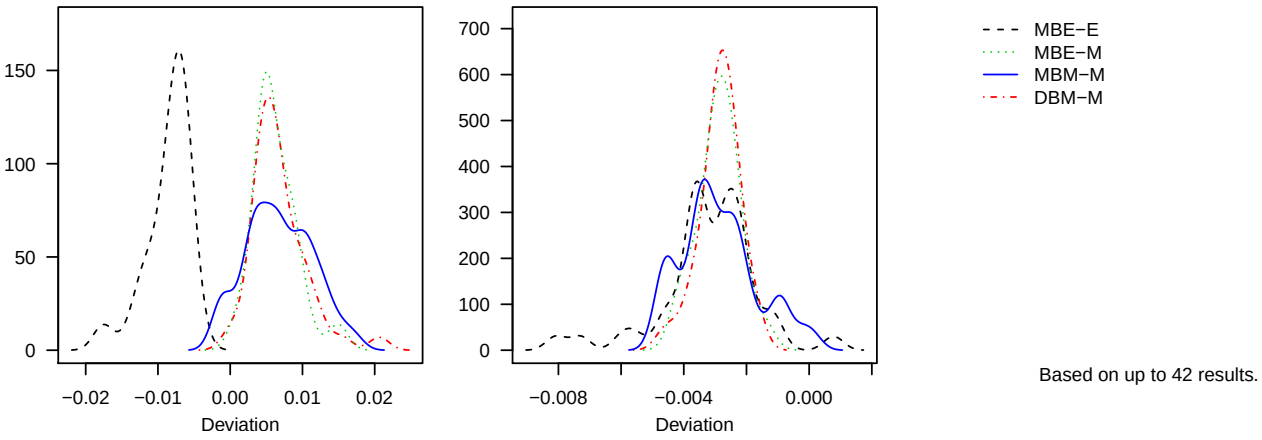


Table 43: RMSE

	beta	sigma2
MBE-E	0.009	0.004
MBE-M	0.007	0.003
MBM-M	0.008	0.003
DBM-M	0.008	0.003

Posterior median

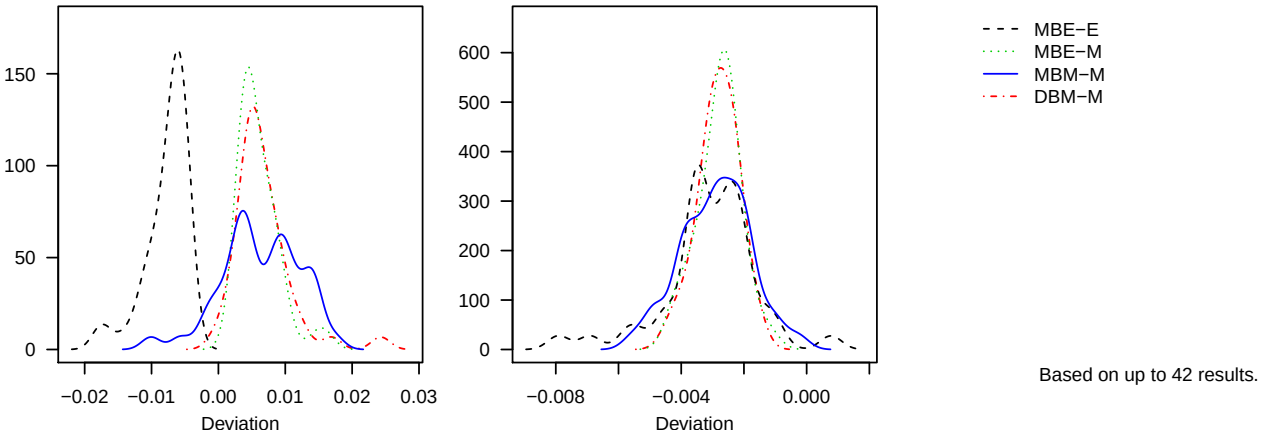


Table 44: RMSE

	beta	sigma2
MBE-E	0.008	0.003
MBE-M	0.007	0.003
MBM-M	0.009	0.003
DBM-M	0.008	0.003

Posterior variance and covariance

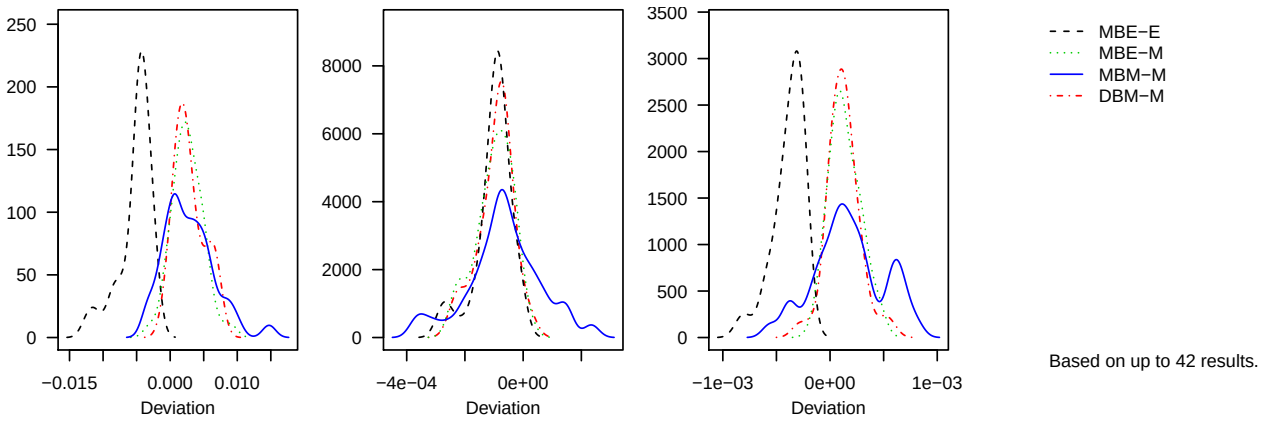


Table 45: RMSE

	beta	sigma2	covariance
MBE-E	0.006	0	0
MBE-M	0.003	0	0
MBM-M	0.005	0	0
DBM-M	0.004	0	0

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
MBE-E	7669843	807004	282143	30905
MBE-M	951493	19843	33907	1575
MBM-M	161801	3126	5761	389
DBM-M	938174	23638	33939	1710

Acceptance rates

	ARpath mean	ARpath sd	ARparam mean	ARparam sd
MBE-E	0.986	0.001	0.26	0.005
MBE-M	0.984	0.002	0.26	0.005
MBM-M	1.000	0.000	0.26	0.006
DBM-M	0.988	0.001	0.26	0.005

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
0	0	0	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

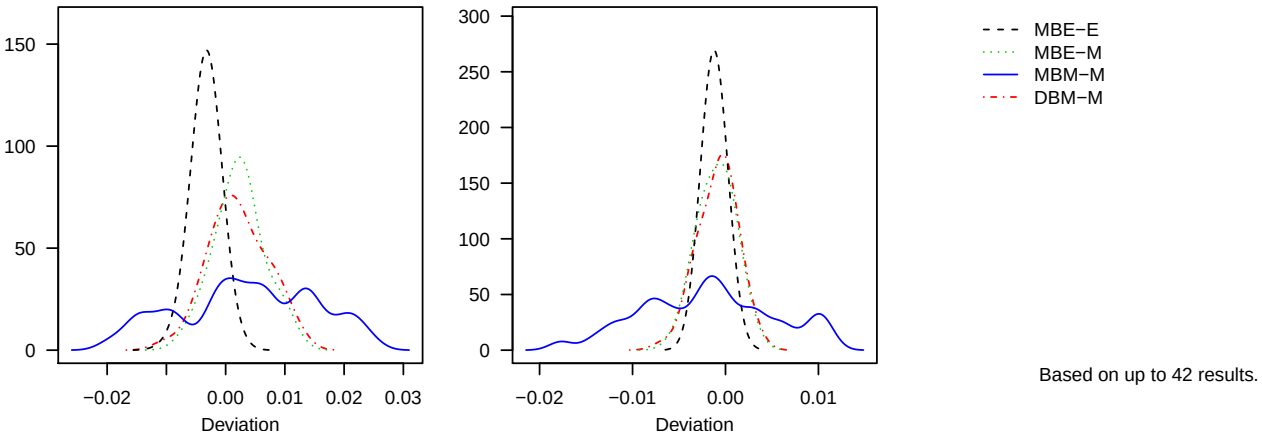


Table 49: RMSE

	beta	sigma2
MBE-E	0.004	0.001
MBE-M	0.005	0.002
MBM-M	0.012	0.007
DBM-M	0.005	0.002

Posterior median

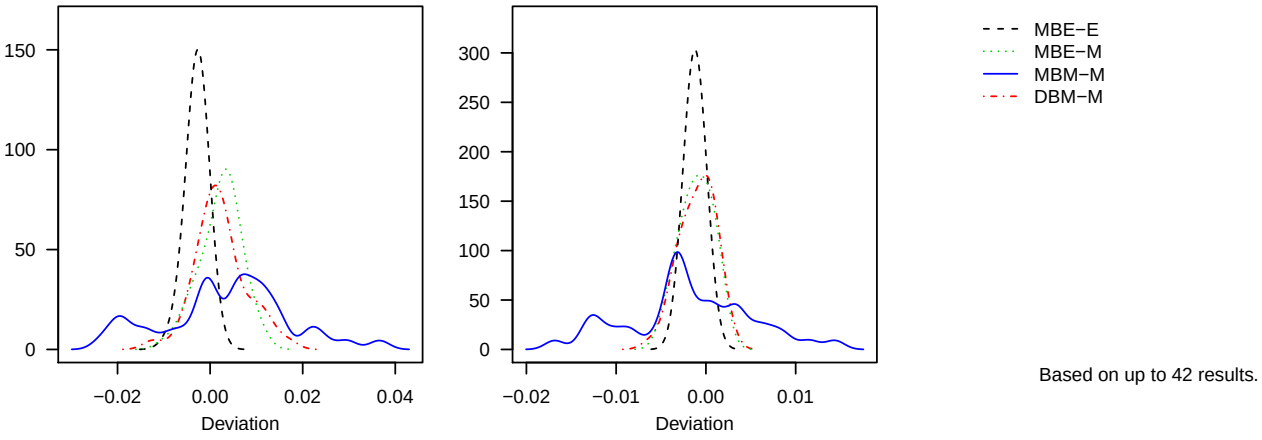


Table 50: RMSE

	beta	sigma2
MBE-E	0.003	0.001
MBE-M	0.005	0.002
MBM-M	0.014	0.007
DBM-M	0.006	0.002

Posterior variance and covariance

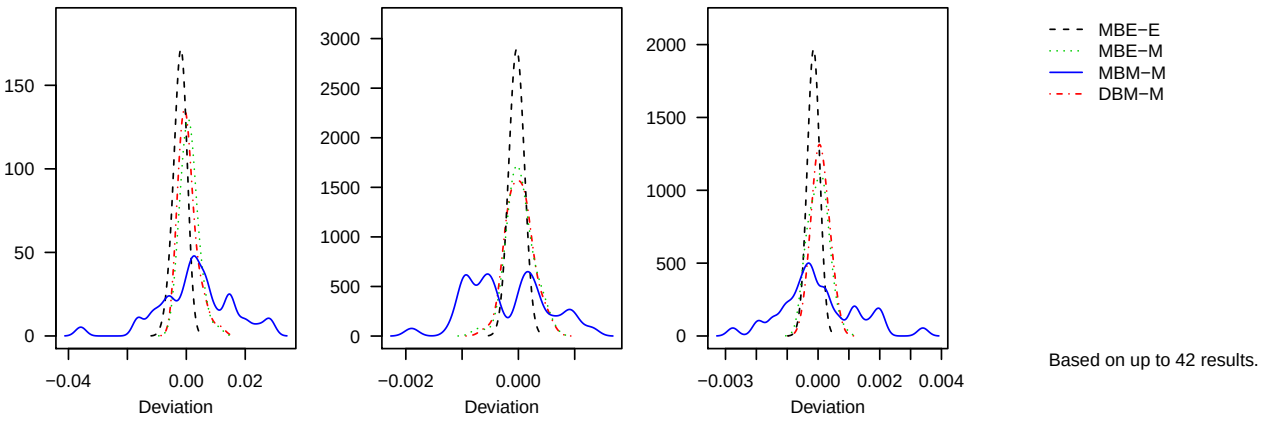


Table 51: RMSE

	beta	sigma2	covariance
MBE-E	0.003	0.000	0.000
MBE-M	0.003	0.000	0.000
MBM-M	0.013	0.001	0.001
DBM-M	0.003	0.000	0.000

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
MBE-E	5903543	192370	60842	3372
MBE-M	424196	17059	4273	366
MBM-M	34370	1234	363	55
DBM-M	423190	8194	4340	347

Acceptance rates

	ARpath mean	ARpath sd	ARparam mean	ARparam sd
MBE-E	0.990	0.001	0.172	0.004
MBE-M	0.986	0.001	0.172	0.004
MBM-M	0.998	0.000	0.172	0.004
DBM-M	0.990	0.001	0.172	0.004

of missing results: 0

Stan results (sampling from and optimizing the true posterior)

M = 10

of missing results: 0

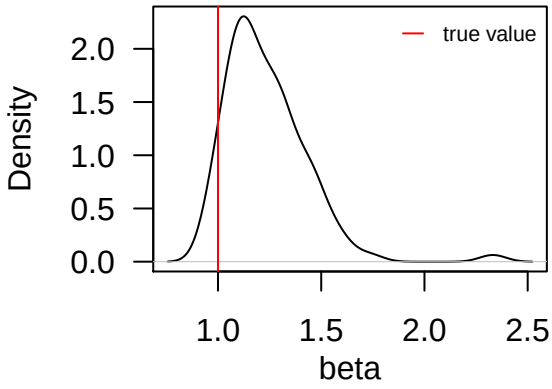
Rhat > 1.01: 0 (out of 200)

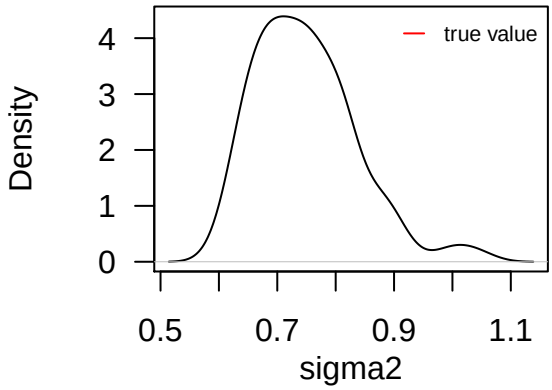
range of max. duration in seconds: (1070.5, 4113.8), median: 1659.4

median multivarESS: 6.44577×10^5

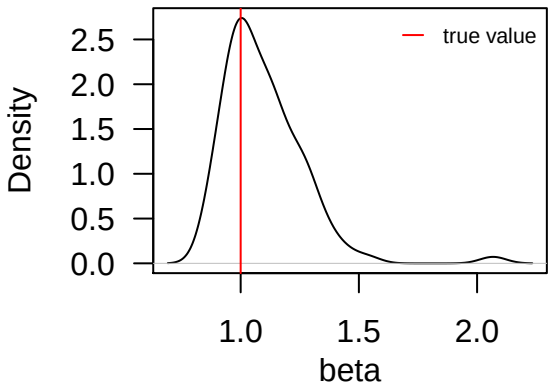
The following sections show density plots of the respective statistic calculated for the 100 simulated datasets.

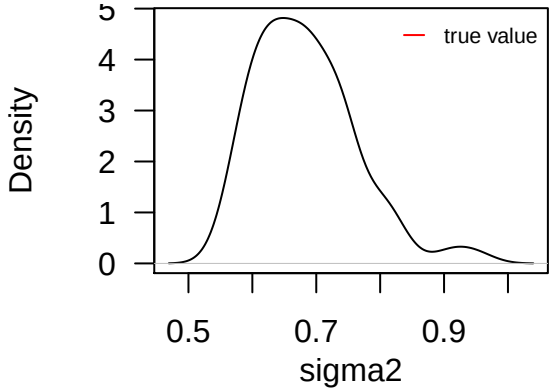
Posterior mean



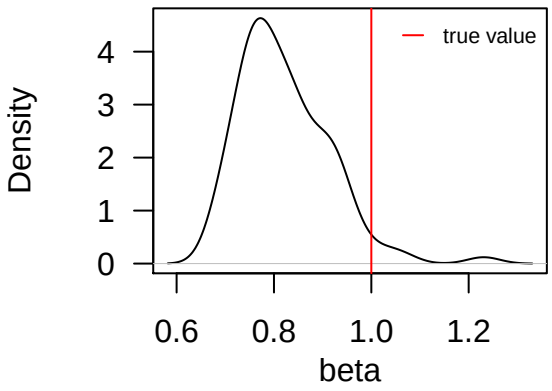


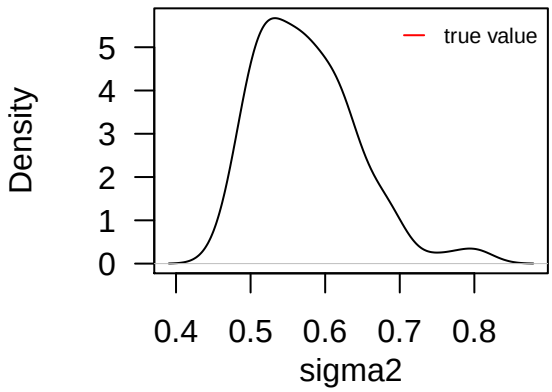
Posterior median



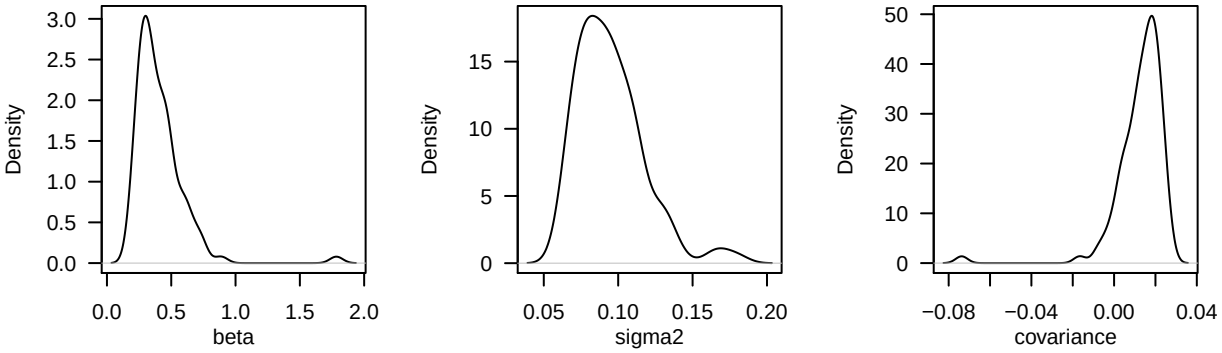


Optimized value

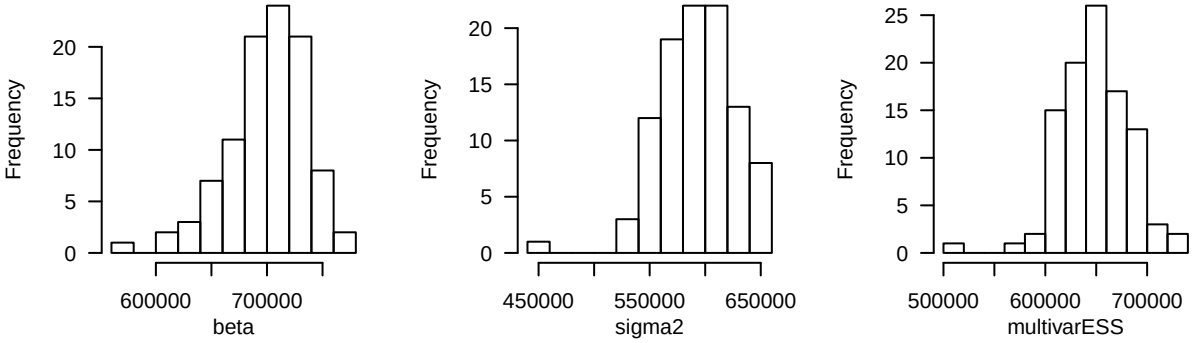




Posterior variance and covariance



Effective sample size



M = 20

of missing results: 0

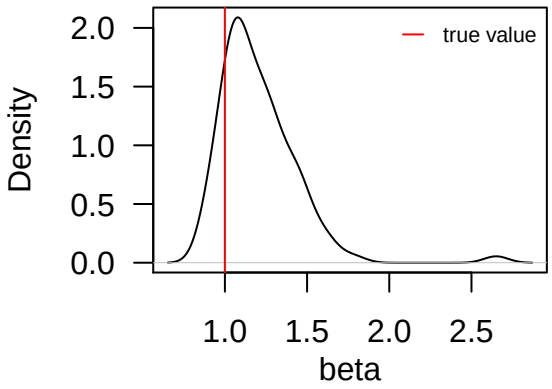
Rhat > 1.01: 0 (out of 200)

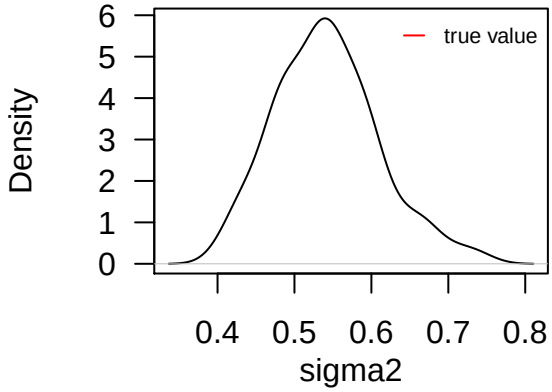
range of max. duration in seconds: $(4262.5, 1.17888 \times 10^4)$, median: 6564.5

median multivarESS: 6.90289×10^5

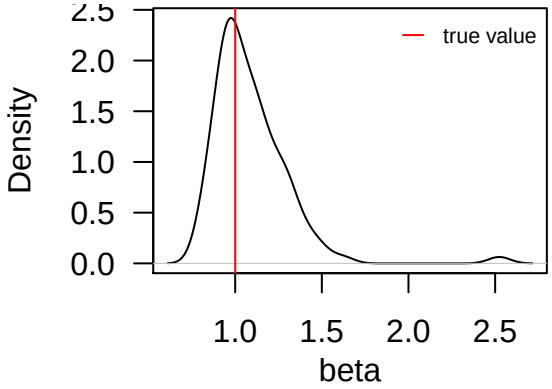
The following sections show density plots of the respective statistic calculated for the 100 simulated datasets.

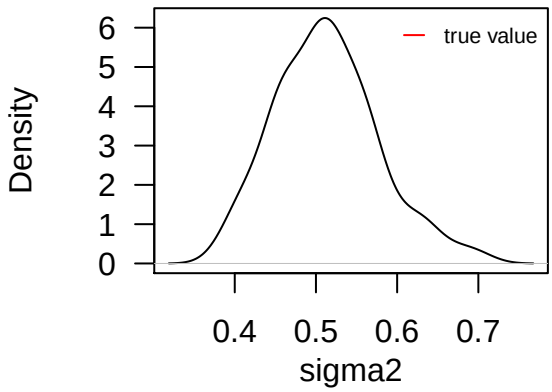
Posterior mean



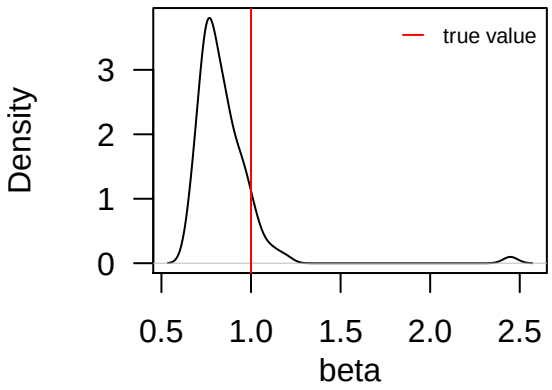


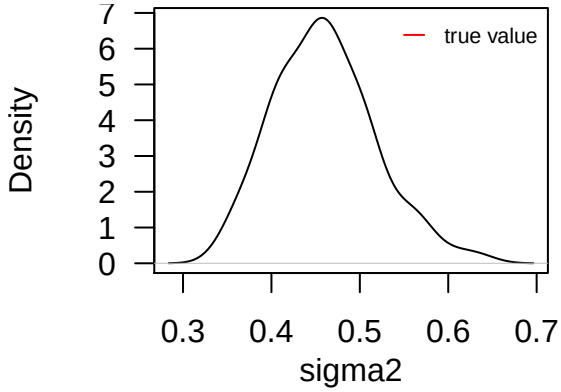
Posterior median



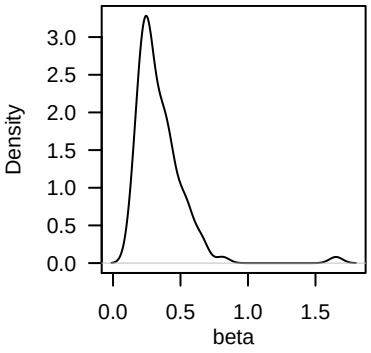


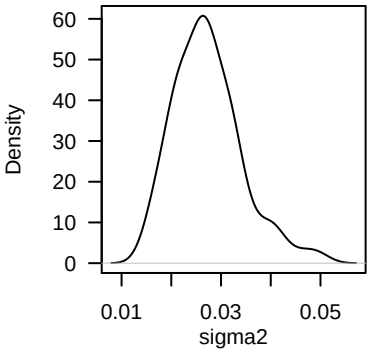
Optimized value

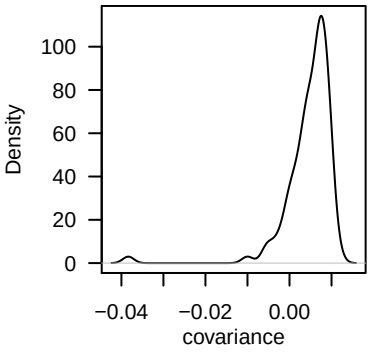




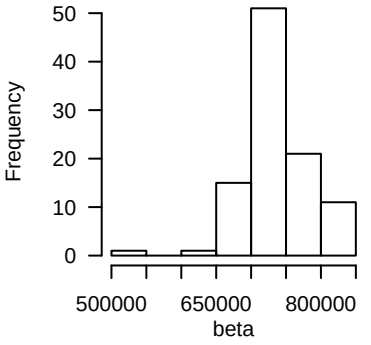
Posterior variance and covariance

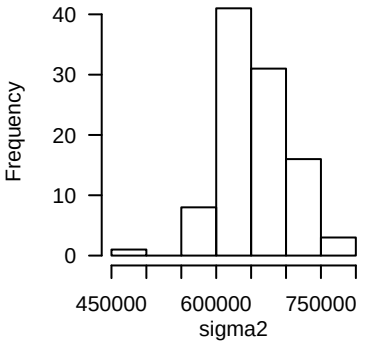


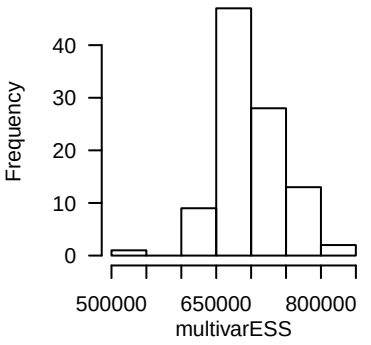




Effective sample size







M = 50

of missing results: 58

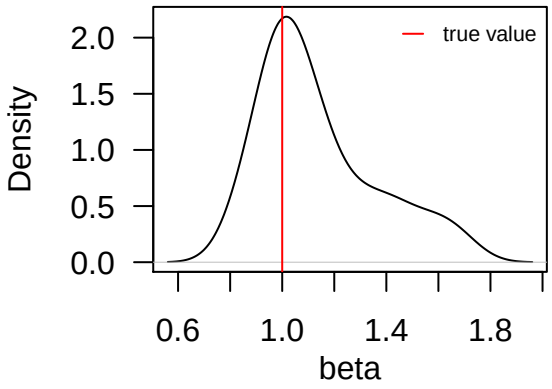
Rhat > 1.01: 0 (out of 200)

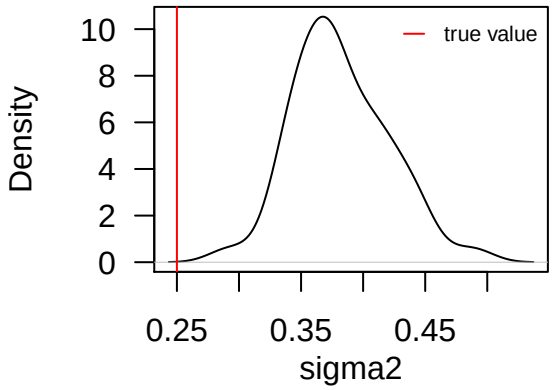
range of max. duration in seconds: $(4.548 \times 10^4, 8.90532 \times 10^4)$, median: 6.24209×10^4

median multivarESS: 7.3862×10^5

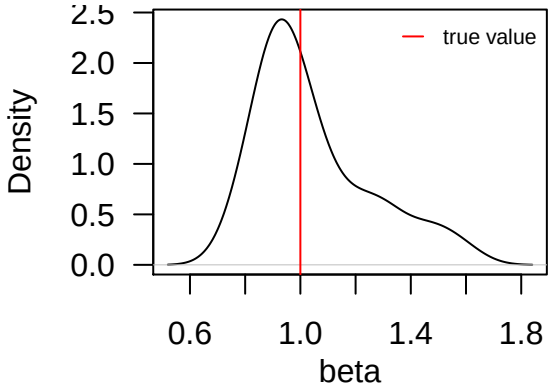
The following sections show density plots of the respective statistic calculated for the 100 simulated datasets.

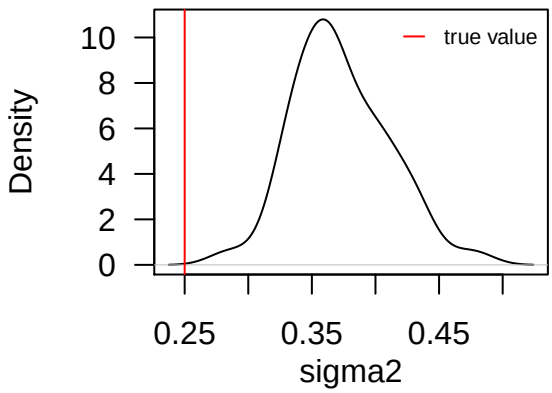
Posterior mean



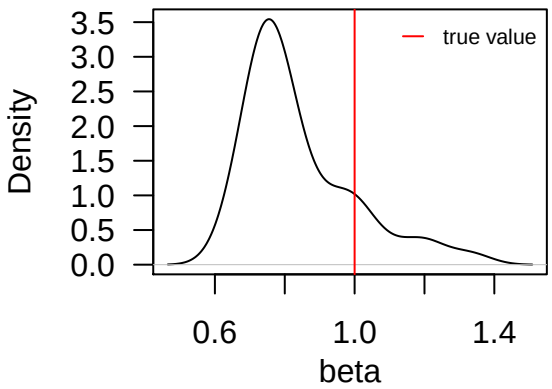


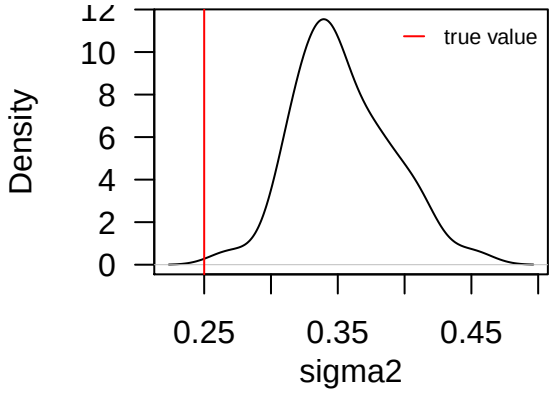
Posterior median



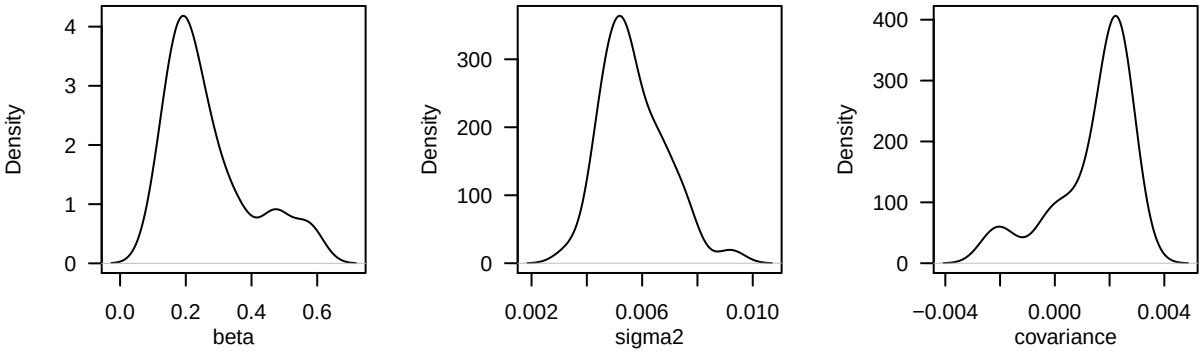


Optimized value

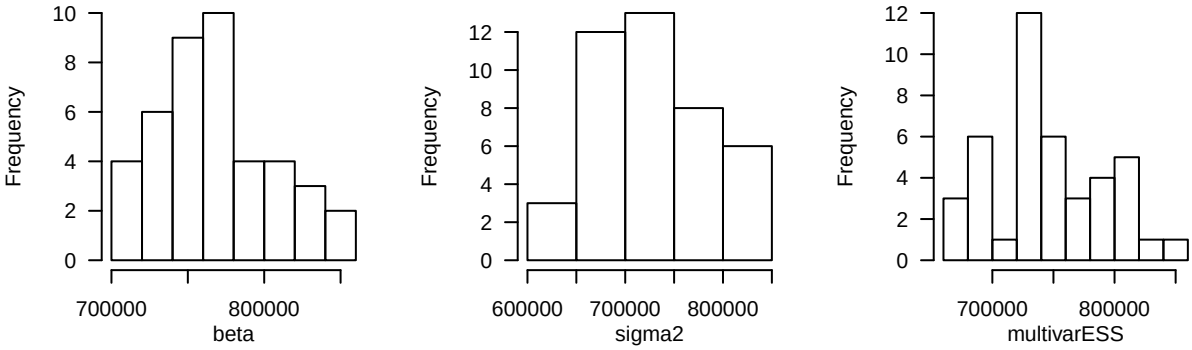




Posterior variance and covariance



Effective sample size



of missing Stan results: 58