Aggregated sampling output

November 20, 2020

Dataset: experimental_data_d2eGFP, model type: SDE

Trajectories without pathologies

e.g. no divergent transitions, no max_treedepth exceeded, no Rhat > 1.1, no n_eff < 100

```
number of trajectories without pathologies (out of 100):
```

```
[1] 63
```

```
indices of trajectories without pathologies:
```

```
 [1]  1  2  4  5  6  7  9 10 11 12 15 17 18 20 21 22 23 25 26 27 28 29 30 31 32
[26] 34 37 38 39 41 42 44 45 46 52 55 57 58 61 63 65 66 69 70 71 73 74 75 77 78
[51] 80 81 82 83 85 86 91 92 95 96 97 98 99
```

no pathologies for a subset of the parameters

```
parameters considered:
```

```
[1] "theta[1]"             "theta[3]"             "sigma"
[4] "scale"                "offset"               "prod_theta2_m0"
[7] "prod_theta2_m0_scale"
```

```
number of trajectories without pathologies (out of 100):
```

```
[1] 84
```

```
indices of trajectories without pathologies:
```

```
 [1]  1  2  3  4  5  6  7  9 10 11 12 13 14 15 17 18 19 20 21 22 23 24 25 26 27
[26] 28 29 30 31 32 34 37 38 39 40 41 42 43 44 45 46 47 48 49 52 53 54 55 57 58
[51] 59 60 61 63 65 66 67 69 70 71 72 73 74 75 77 78 80 81 82 83 85 86 88 89 90
[76] 91 92 93 94 95 96 97 98 99
```

Divergent transitions

num..of.div..transitions	Freq
0	90
8	2
10	1
14	1
20	1
22	1
30	1
41	1
72	1
540	1

```
total number of trajectories with div. transitions: 10
indices of trajectories with div. transitions:
16 33 35 36 50 56 76 79 87 100
```

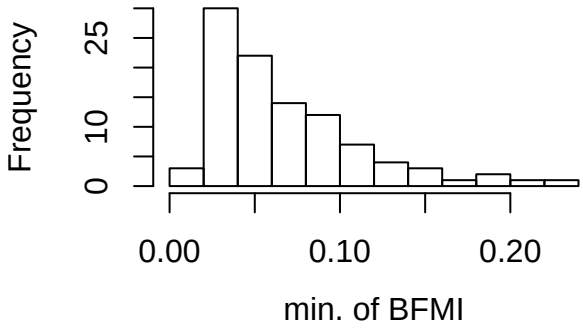
Maximum tree depth exceeded

num..of.max.t.d..exceeded	Freq
0	95
1	1
10	1
20	1
21	1
59	1

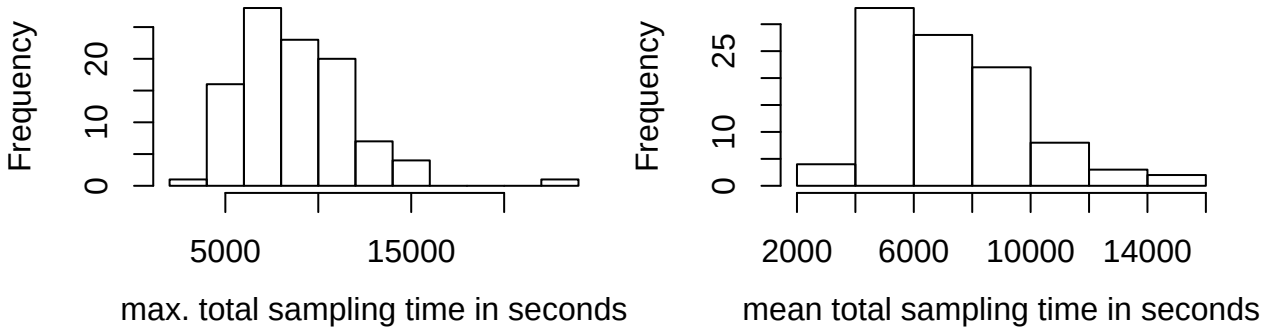
```
total number of trajectories were max. tree depth was exceeded: 5
indices of trajectories were max. tree depth was exceeded:
8 35 51 62 68
```

Bayesian fraction of missing information (BFMI)

num..of.low.BFMI	Freq
0	2
1	3
3	1
5	1
6	2
7	1
8	90



Total sampling time



R-hat

total number of trajectories with very high Rhat (> 1.1) (out of 100)

```
[1] 25
```

number of trajectories with high Rhat per parameter (out of 100)

	Rhat > 1.02	Rhat > 1.1
theta[1]	28	1
theta[2]	46	2
theta[3]	46	1
m0	65	18
sigma	1	0
scale	52	1
offset	0	0
prod_theta2_m0	49	2
prod_theta2_scale	63	1
prod_m0_scale	57	11
prod_theta2_m0_scale	8	0
x[180,1]	73	23
x[180,2]	56	2

number of parameters with high Rhat per trajectory (out of 13)

	2	3	4	5	6	7	8	9	10	13	14	15	16	17	19	22	23	24	25	28
Rhat > 1.02	8	5	3	10	1	5	9	8	4	9	5	7	6	3	8	3	4	5	6	3
Rhat > 1.1	0	1	0	0	0	0	2	0	0	3	3	0	3	0	2	0	0	0	0	0

	29	32	33	34	35	36	39	40	41	42	43	44	45	46	47	48	49	50	51	52
Rhat > 1.02	3	4	10	8	9	3	4	10	3	6	9	9	1	2	7	9	10	9	8	5
Rhat > 1.1	0	0	0	0	3	0	0	2	0	0	0	0	0	0	1	3	1	3	0	0

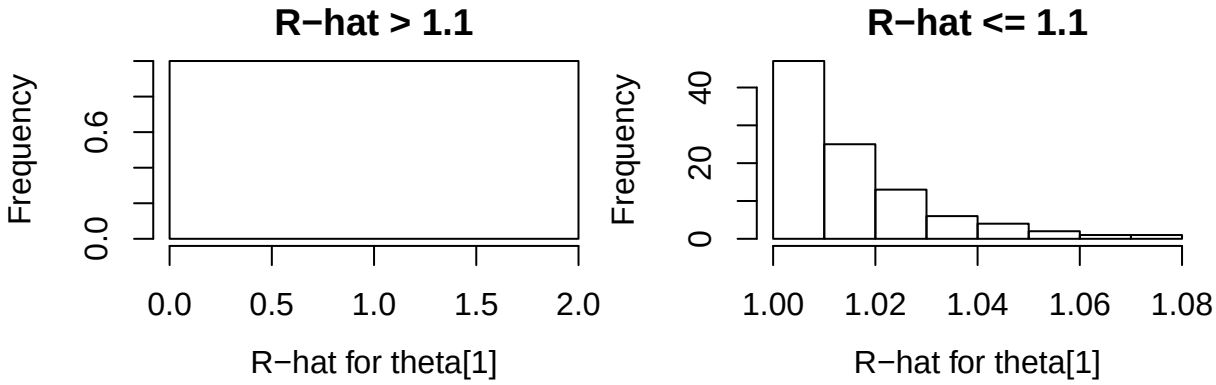
	53	54	55	56	58	59	60	61	62	63	64	65	66	67	68	69	71	72	75	76
Rhat > 1.02	10	9	5	9	2	10	7	5	10	8	11	7	7	11	2	6	2	10	5	7
Rhat > 1.1	0	0	0	3	0	2	2	0	3	0	7	0	0	3	0	0	0	1	0	0

	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
Rhat > 1.02	5	10	6	4	8	3	8	10	3	5	8	7	10	9	8	5	7	10	3	5
Rhat > 1.1	0	0	0	0	0	0	0	1	0	0	2	0	0	1	0	0	2	3	0	0

theta[1]

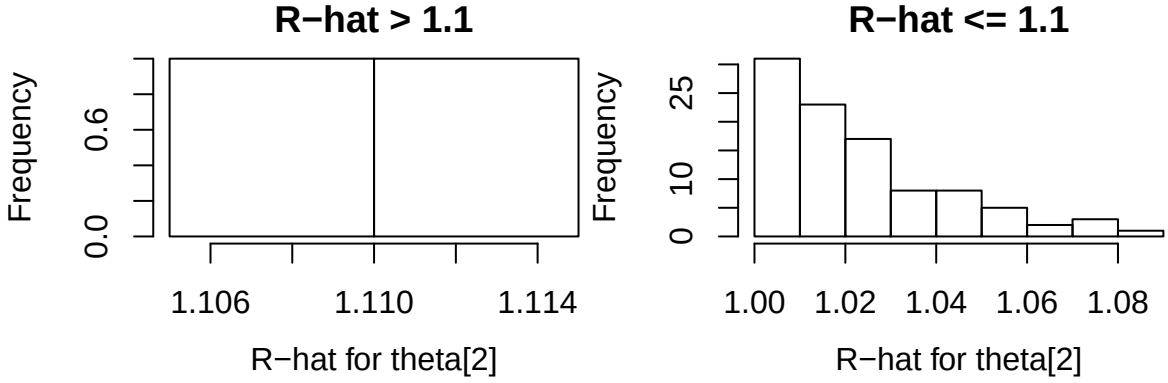
```
number of trajectories with Rhat > 1.02:    28

indizes of trajectories with Rhat > 1.02:
5 8 9 19 33 40 44 47 49 51 53 56 59 60 61 62 64 66 67 72 78 83 84 89 93 96 97 100
```

```
number of trajectories with Rhat > 1.1: 1

indices of trajectories with Rhat > 1.1:
64
```



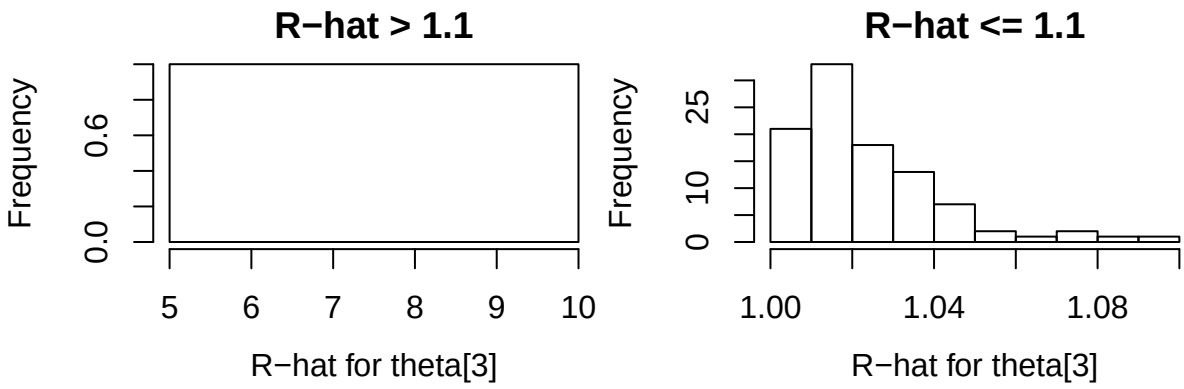
theta[2]

```
number of trajectories with Rhat > 1.02:    46

indizes of trajectories with Rhat > 1.02:
2 3 5 7 8 13 14 16 19 24 25 33 35 40 43 47 48 49 50 51 53 54 55 56 59 60 62 63 64 67 69 72 76 77 78 79 8

number of trajectories with Rhat > 1.1: 2

indices of trajectories with Rhat > 1.1:
64 100
```



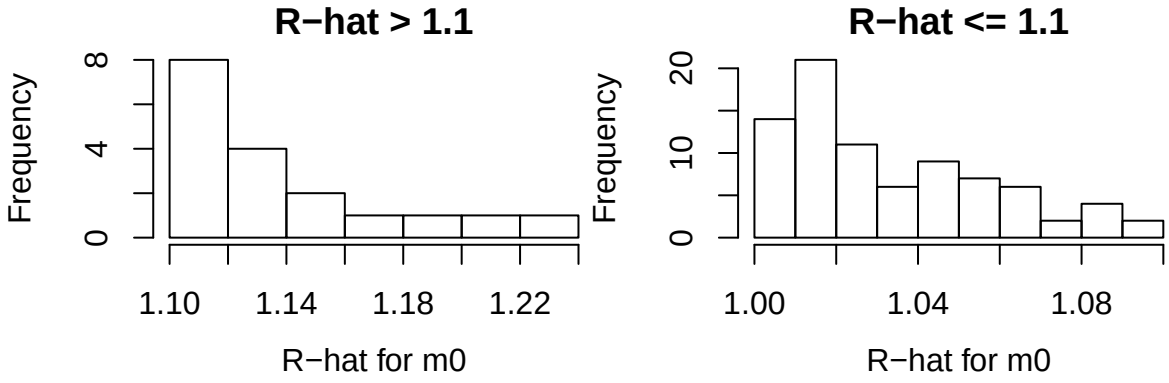
theta[3]

```
number of trajectories with Rhat > 1.02:    46

indizes of trajectories with Rhat > 1.02:
5 6 8 9 15 19 22 23 33 34 35 40 43 44 47 49 51 53 54 56 59 60 61 62 63 64 65 66 67 68 69 72 78 83 84 86

number of trajectories with Rhat > 1.1: 1

indices of trajectories with Rhat > 1.1:
64
```



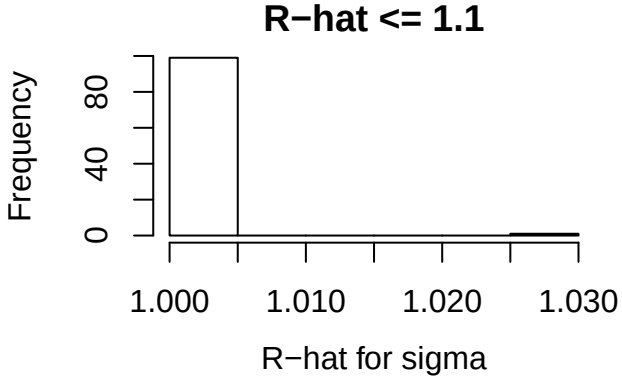
m0

```
number of trajectories with Rhat > 1.02:    65

indizes of trajectories with Rhat > 1.02:
2 3 4 5 7 8 9 13 14 15 16 19 22 23 24 28 33 34 35 36 40 42 43 44 47 48 49 50 51 52 53 54 55 56 58 59 60

number of trajectories with Rhat > 1.1: 18

indices of trajectories with Rhat > 1.1:
3 13 14 16 19 35 40 48 50 56 59 60 62 67 87 93 94 100
```



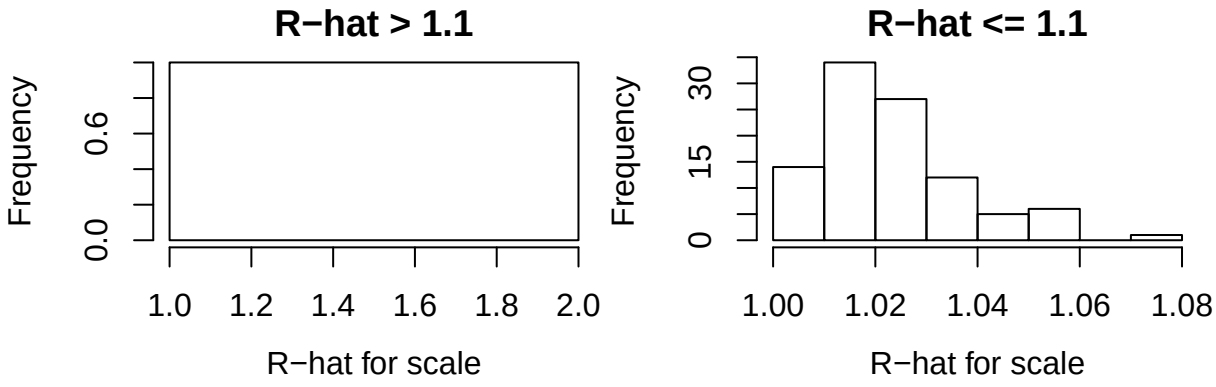
sigma

```
number of trajectories with Rhat > 1.02:    1

indizes of trajectories with Rhat > 1.02:
64
```



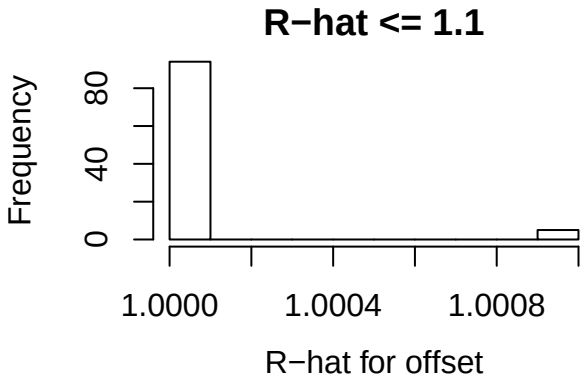
scale

```
number of trajectories with Rhat > 1.02:    52

indizes of trajectories with Rhat > 1.02:
2 5 8 9 10 13 15 16 17 19 25 29 32 33 34 35 39 40 41 43 44 45 48 49 50 51 52 53 54 56 59 62 63 64 65 66

number of trajectories with Rhat > 1.1: 1

indices of trajectories with Rhat > 1.1:
64
```



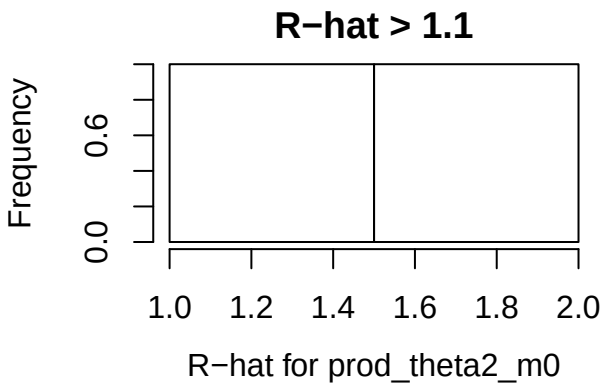
offset

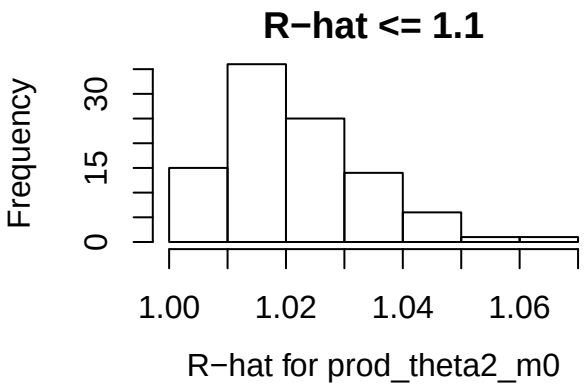
```
no Rhat > 1.02
```



prod_theta2_m0

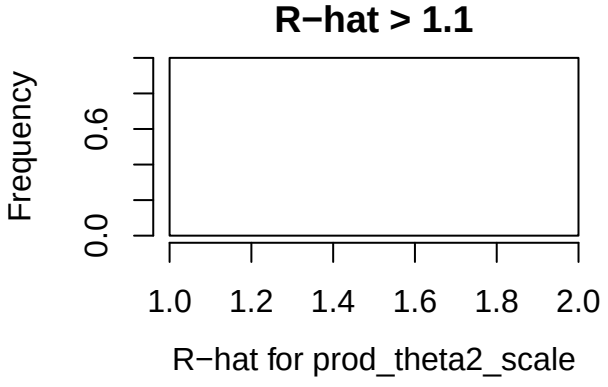
```
number of trajectories with Rhat > 1.02:    49

indizes of trajectories with Rhat > 1.02:
2 5 8 9 10 13 15 17 25 29 32 33 34 39 40 41 42 43 44 46 48 49 50 53 54 59 61 62 64 65 66 67 72 75 78 80

number of trajectories with Rhat > 1.1: 2

indices of trajectories with Rhat > 1.1:
8 64
```

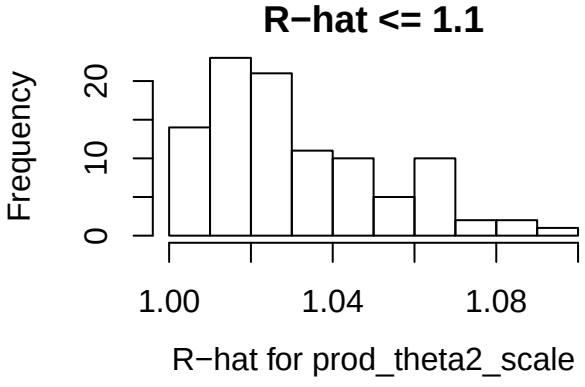




prod__theta2__scale

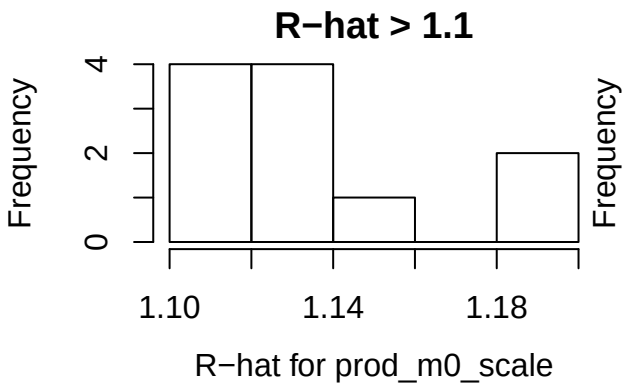
```
number of trajectories with Rhat > 1.02:    63

indizes of trajectories with Rhat > 1.02:
2 3 5 7 8 13 14 15 16 19 23 24 32 33 34 35 40 42 43 44 47 48 49 50 51 52 53 54 55 56 59 60 62 63 64 65 6

number of trajectories with Rhat > 1.1: 1

indices of trajectories with Rhat > 1.1:
100
```

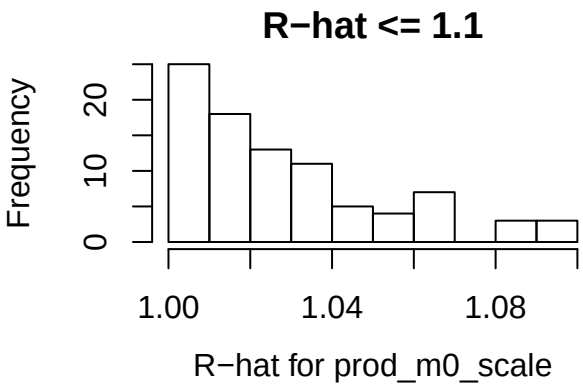




prod__m0__scale

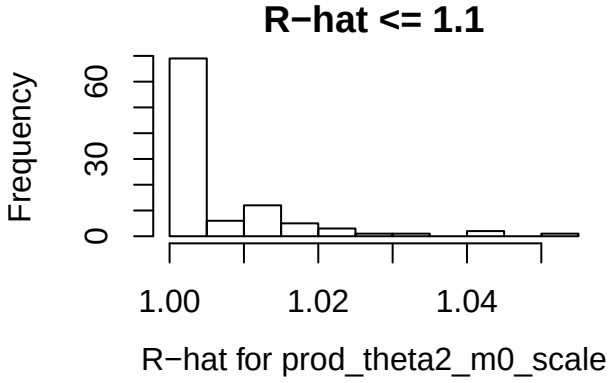
```
number of trajectories with Rhat > 1.02:    57

indizes of trajectories with Rhat > 1.02:
2 3 4 5 7 9 13 14 16 19 24 25 28 33 34 35 36 39 40 42 43 44 47 48 49 50 51 52 53 54 55 56 59 60 62 63 64

number of trajectories with Rhat > 1.1: 11

indices of trajectories with Rhat > 1.1:
13 14 16 35 48 50 56 62 67 94 100
```





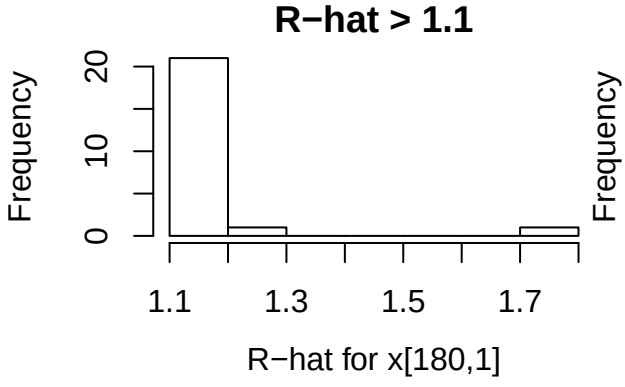
prod_theta2_m0_scale

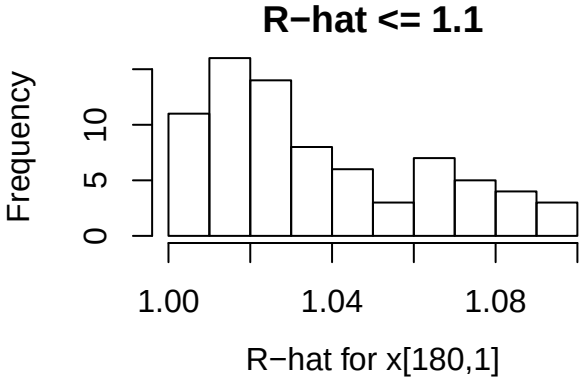
```
number of trajectories with Rhat > 1.02:    8

indizes of trajectories with Rhat > 1.02:
13 35 48 50 67 90 94 100
```



x[180,1]

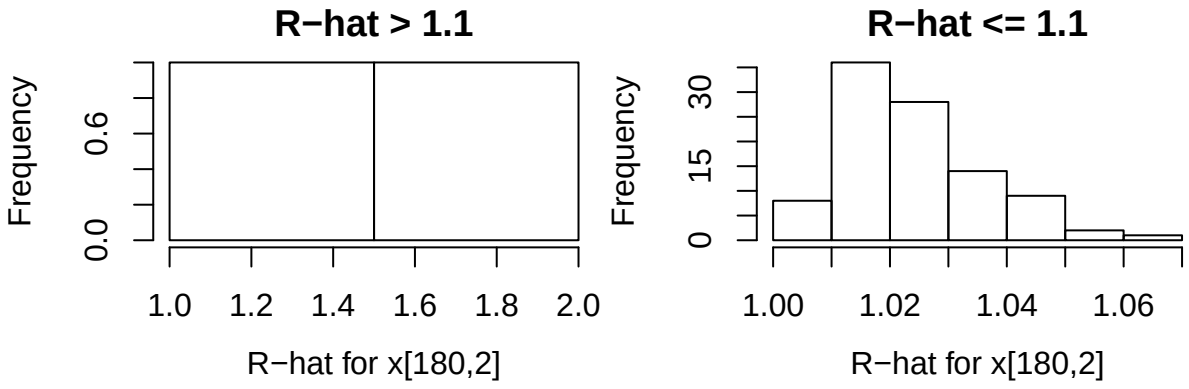
```
number of trajectories with Rhat > 1.02:    73

indizes of trajectories with Rhat > 1.02:
2 3 4 5 7 8 9 10 13 14 15 16 19 22 23 24 25 28 33 34 35 36 40 42 43 44 47 48 49 50 51 52 53 54 55 56 58

number of trajectories with Rhat > 1.1: 23

indices of trajectories with Rhat > 1.1:
13 14 16 19 35 40 47 48 49 50 56 59 60 62 64 67 72 84 87 90 93 94 100
```





x[180,2]

```
number of trajectories with Rhat > 1.02:    56

indizes of trajectories with Rhat > 1.02:
2 5 8 9 10 13 15 17 25 29 32 33 34 35 39 40 41 42 43 44 46 48 49 50 53 54 56 59 61 62 63 64 65 66 67 71

number of trajectories with Rhat > 1.1: 2

indices of trajectories with Rhat > 1.1:
8 64
```



Effective sample size (ESS)

total number of trajectories with low ESS (< 100) (out of 100)

```
[1] 31
```

number of trajectories with low ESS (< 100) per parameter (out of 100)

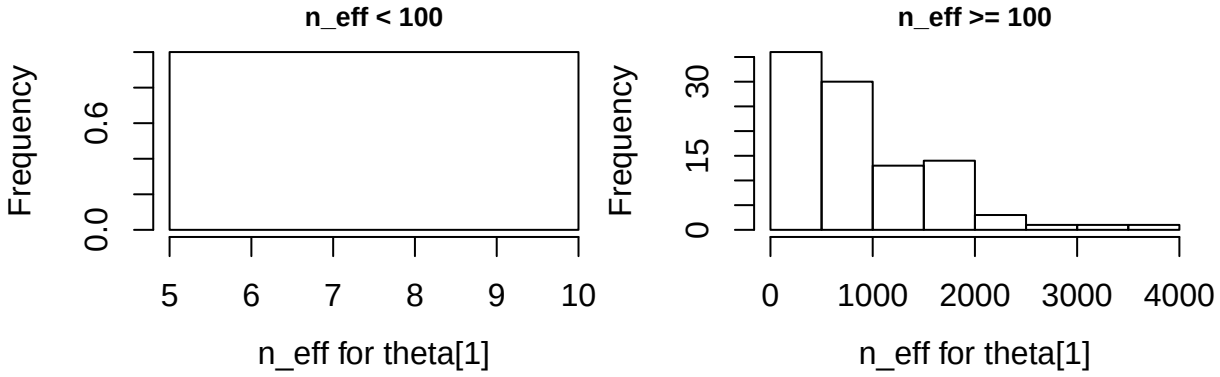
	n_eff < 100
theta[1]	1
theta[2]	2
theta[3]	2
m0	22
sigma	0
scale	1
offset	0
prod_theta2_m0	2
prod_theta2_scale	4
prod_m0_scale	16
prod_theta2_m0_scale	0
x[180,1]	29
x[180,2]	2

number of parameters with low ESS (< 300) per trajectory (out of 13)

	8	13	14	16	19	24	35	40	43	47	48	49	50	53	54	56	59	60	62	64
n_eff < 100	3	3	3	3	2	1	3	3	3	1	3	2	3	1	1	3	3	2	3	7

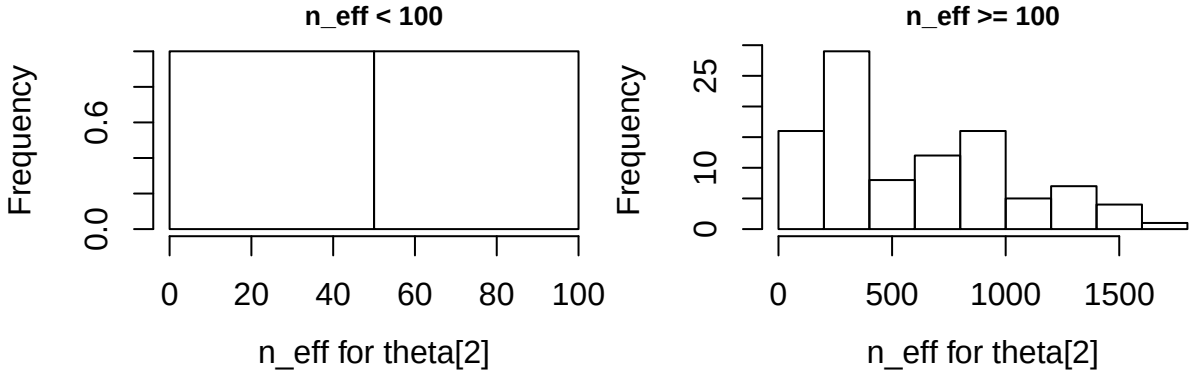
theta[1]

```
number of trajectories with n_eff < 100:    1

indices of trajectories with n_eff < 100:
64
```



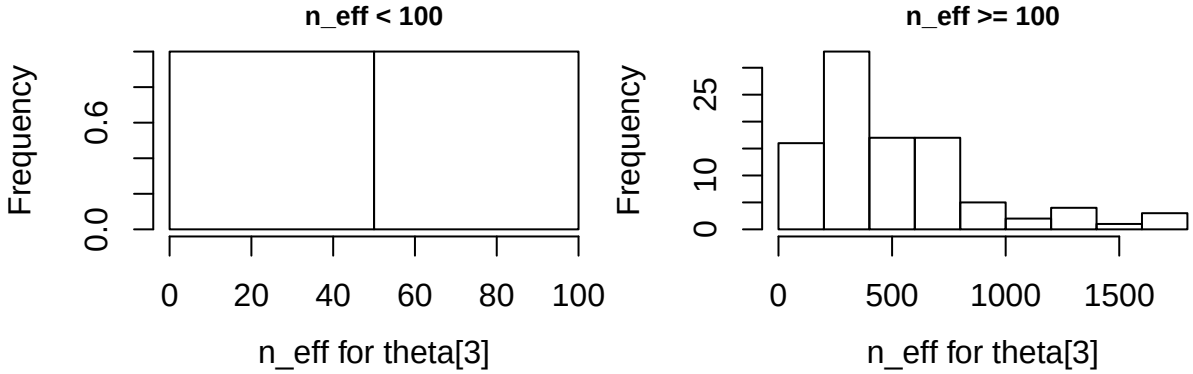
theta[2]

```
number of trajectories with n_eff < 100:    2

indices of trajectories with n_eff < 100:
64 100
```



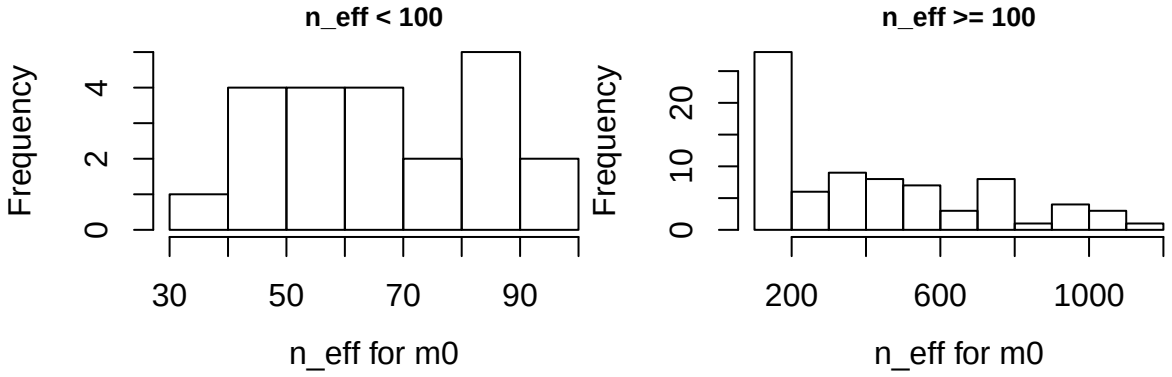
theta[3]

```
number of trajectories with n_eff < 100:    2

indices of trajectories with n_eff < 100:
64 84
```



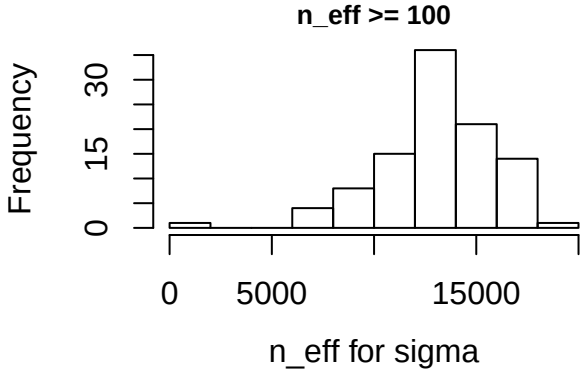
m0

```
number of trajectories with n_eff < 100:    22

indices of trajectories with n_eff < 100:
13 14 16 19 35 40 43 48 49 50 56 59 60 62 67 76 79 87 88 90 93 100
```



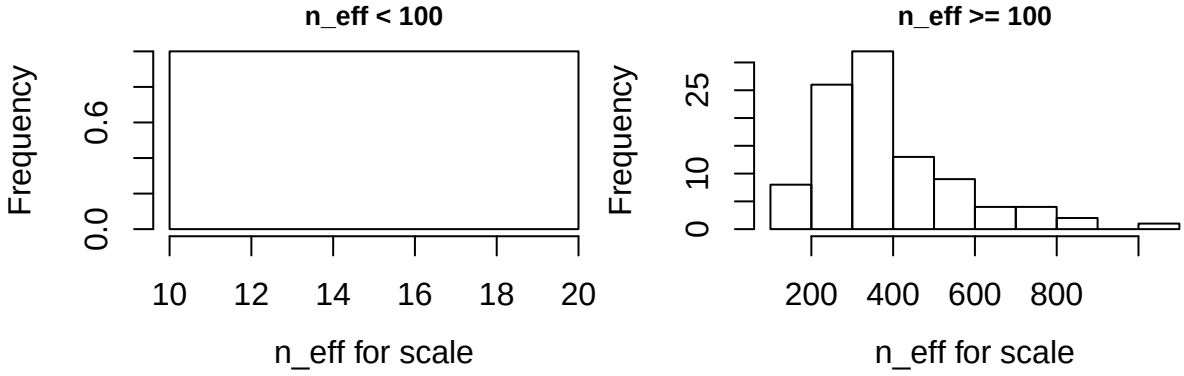
sigma

```
no n_eff < 100
```



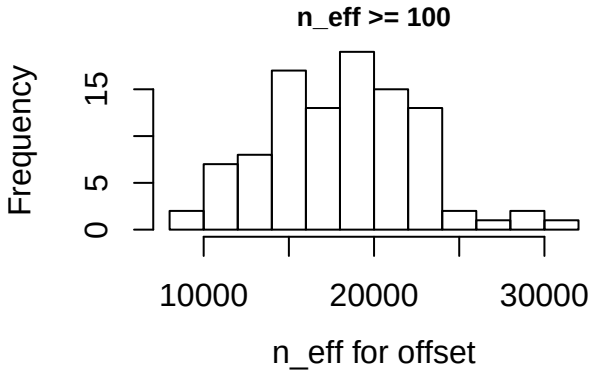
scale

```
number of trajectories with n_eff < 100:    1

indices of trajectories with n_eff < 100:
64
```



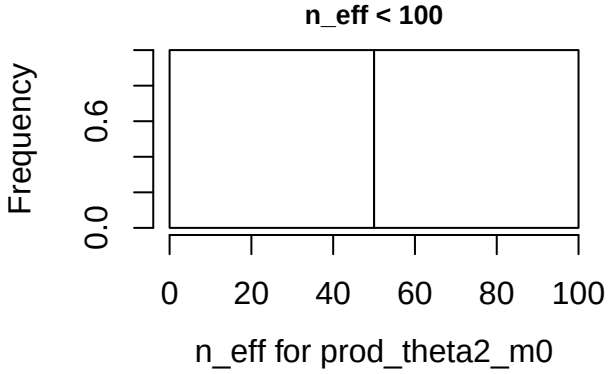
offset

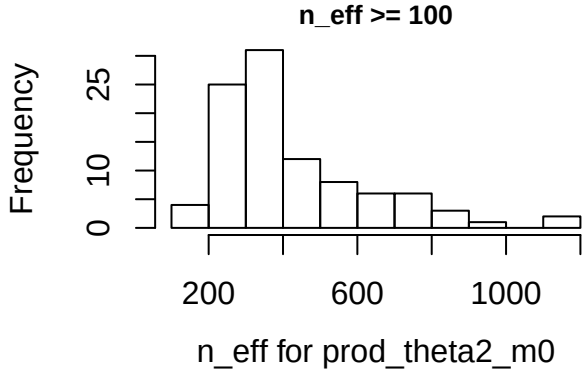
```
no n_eff < 100
```



prod_theta2_m0

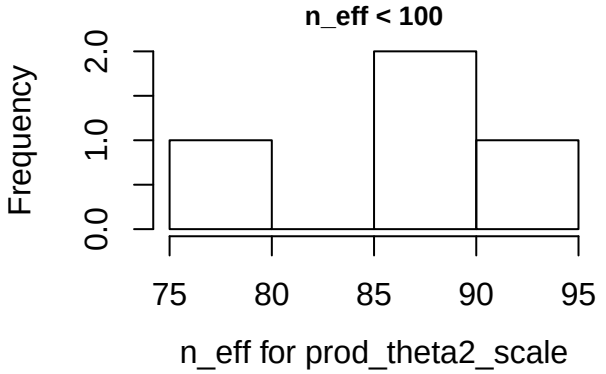
```
number of trajectories with n_eff < 100:    2

indices of trajectories with n_eff < 100:
8 64
```

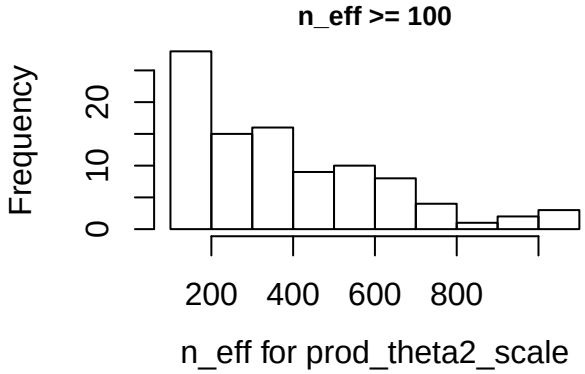




prod_theta2_scale

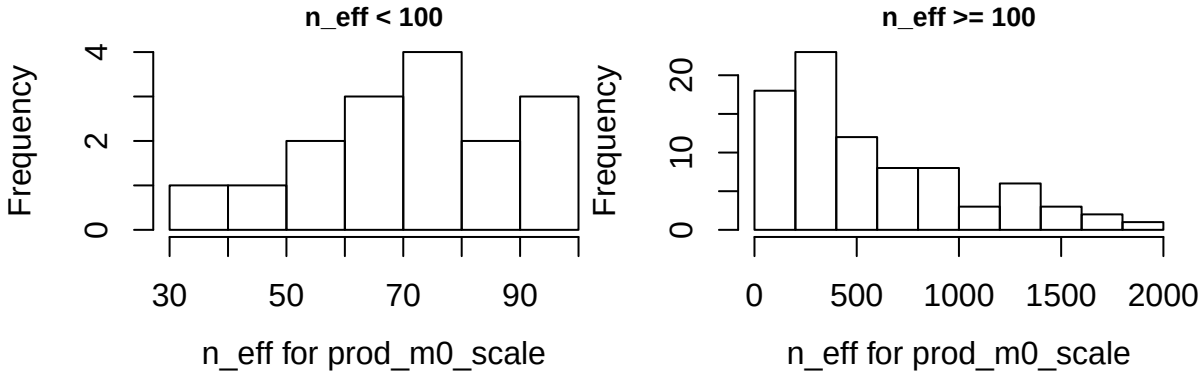
```
number of trajectories with n_eff < 100:    4

indices of trajectories with n_eff < 100:
8 43 87 100
```





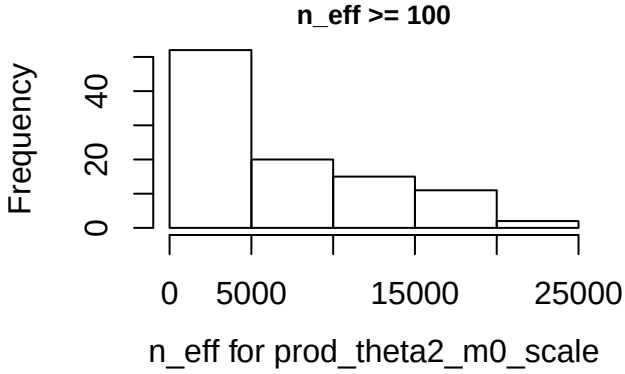
prod_m0_scale

```
number of trajectories with n_eff < 100:    16

indices of trajectories with n_eff < 100:
13 14 16 35 40 48 50 56 59 62 67 76 79 87 93 100
```



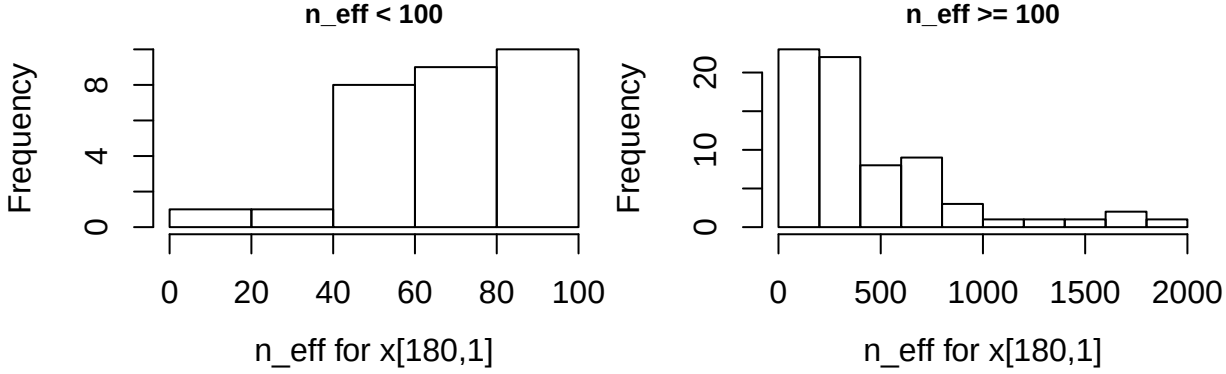
prod_theta2_m0_scale

```
no n_eff < 100
```



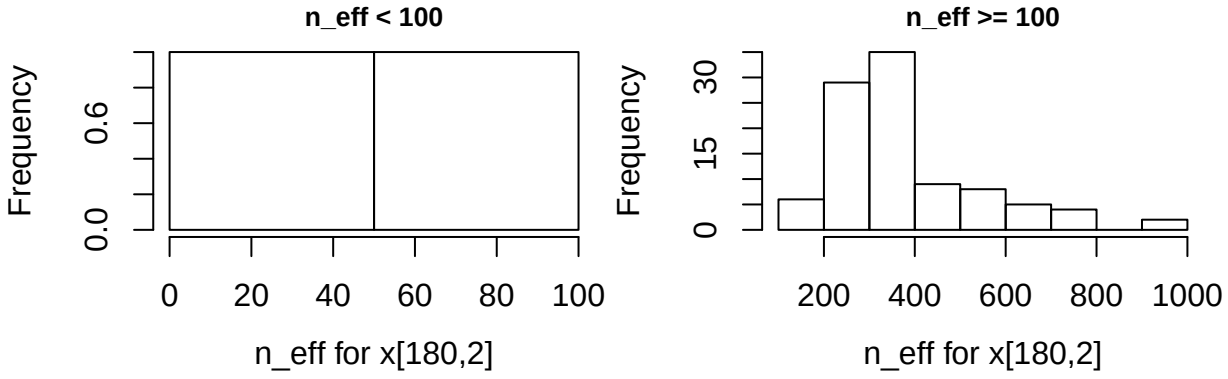
x[180,1]

```
number of trajectories with n_eff < 100:    29

indices of trajectories with n_eff < 100:
13 14 16 19 24 35 40 43 47 48 49 50 53 54 56 59 60 62 64 67 72 79 84 87 88 89 90 93 100
```



x[180,2]

```
number of trajectories with n_eff < 100:    2

indices of trajectories with n_eff < 100:
8 64
```



Find problematic trajectories and parameters

Are there any trajectories and parameters for which n_eff is below the threshold, but Rhat does not exceed the threshold?

```
## [1] FALSE
```

parameters per trajectories with very high Rhat

```
3:   m0
8:   prod_theta2_m0  x[180,2]
13:   m0  prod_m0_scale  x[180,1]
14:   m0  prod_m0_scale  x[180,1]
16:   m0  prod_m0_scale  x[180,1]
19:   m0  x[180,1]
35:   m0  prod_m0_scale  x[180,1]
40:   m0  x[180,1]
47:   x[180,1]
48:   m0  prod_m0_scale  x[180,1]
49:   x[180,1]
50:   m0  prod_m0_scale  x[180,1]
56:   m0  prod_m0_scale  x[180,1]
59:   m0  x[180,1]
60:   m0  x[180,1]
62:   m0  prod_m0_scale  x[180,1]
64:   theta[1]  theta[2]  theta[3]  scale  prod_theta2_m0  x[180,1]  x[180,2]
67:   m0  prod_m0_scale  x[180,1]
72:   x[180,1]
84:   x[180,1]
87:   m0  x[180,1]
90:   x[180,1]
93:   m0  x[180,1]
94:   m0  prod_m0_scale  x[180,1]
100:   theta[2]  m0  prod_theta2_scale  prod_m0_scale  x[180,1]
```

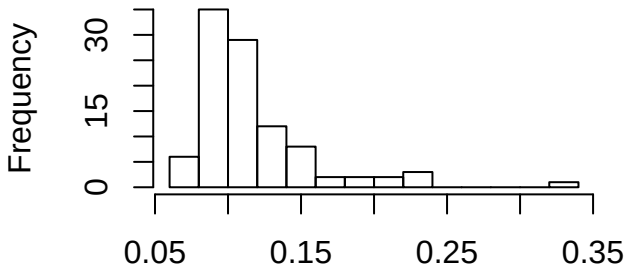
unique combinations:

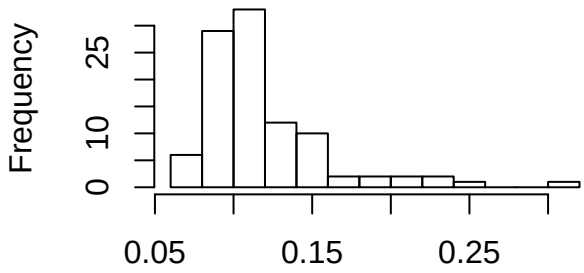
```
number of unique combinations:  7

combinations and number of their occruence:
```

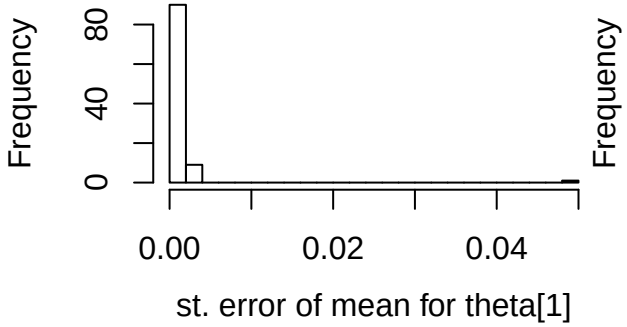
```
1  :  m0
1  :  prod_theta2_m0  x[180,2]
10  :  m0  prod_m0_scale  x[180,1]
6  :  m0  x[180,1]
5  :  x[180,1]
1  :  theta[1]  theta[2]  theta[3]  scale  prod_theta2_m0  x[180,1]  x[180,2]
1  :  theta[2]  m0  prod_theta2_scale  prod_m0_scale  x[180,1]
```

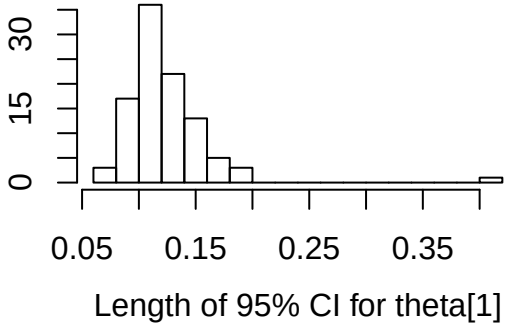
Overview of estimates

theta[1]

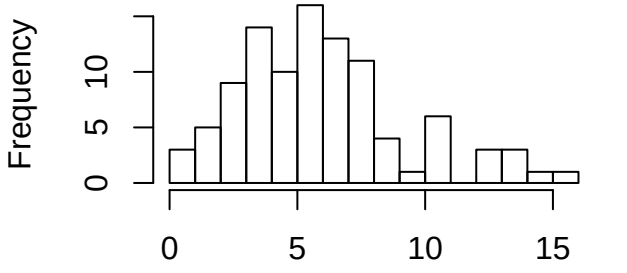


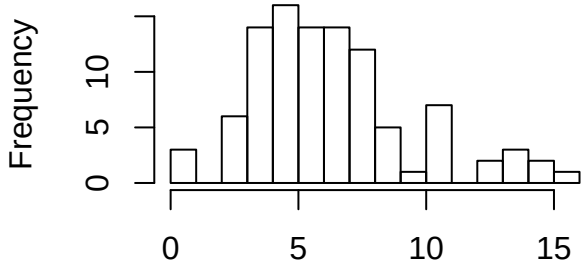


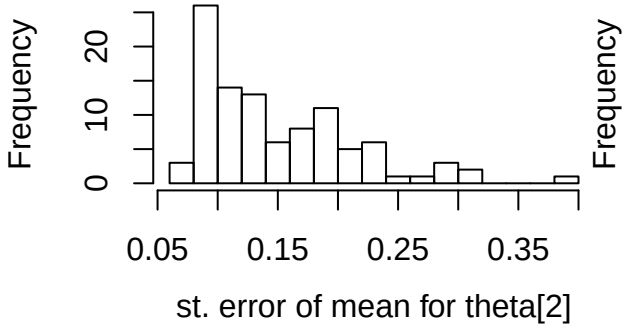


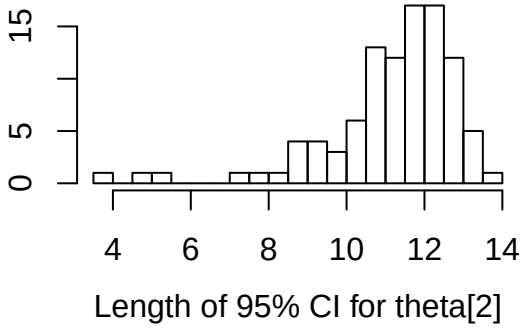


theta[2]

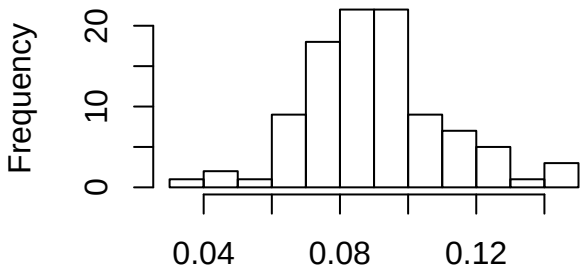


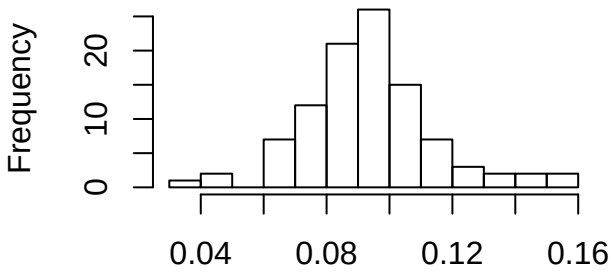


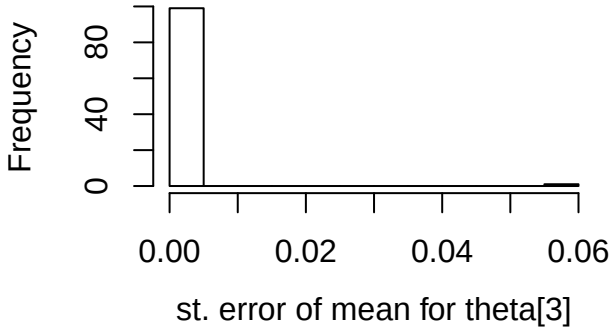


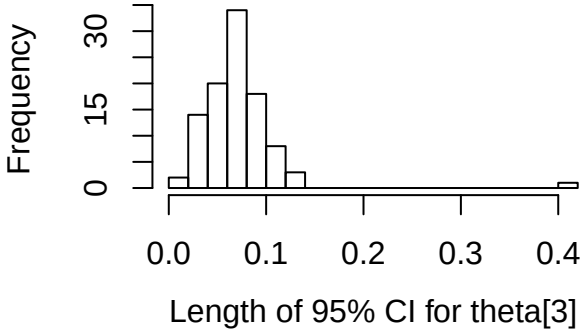


theta[3]

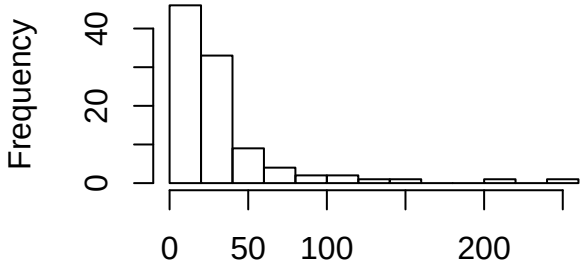

Frequency
0
10
20
0.04
0.08
0.12
Median estimates for theta[3]

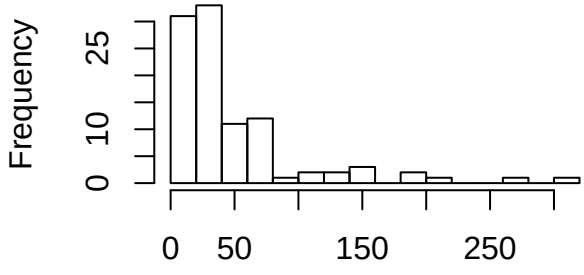

Frequency
0
10
20
0.04
0.08
0.12
0.16
Mean estimates for theta[3]

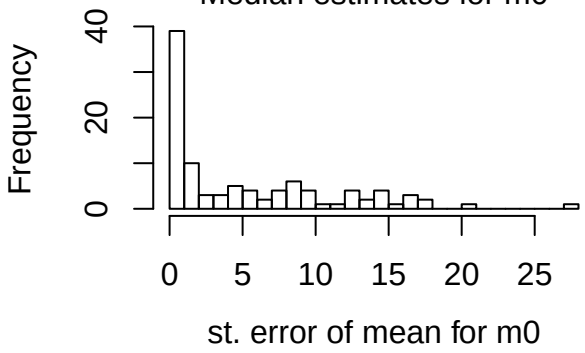

Frequency
0
40
80
0.00
0.02
0.04
0.06
st. error of mean for theta[3]

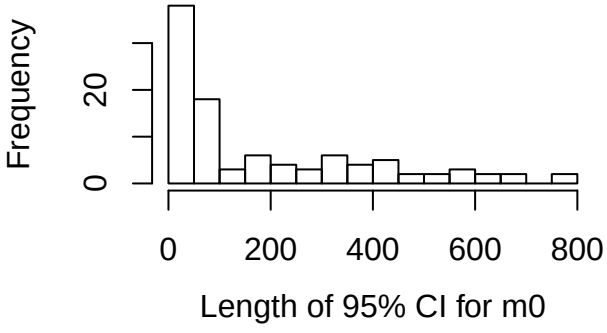

Frequency
0
15
30
0.0
0.1
0.2
0.3
0.4
Length of 95% CI for theta[3]

m0

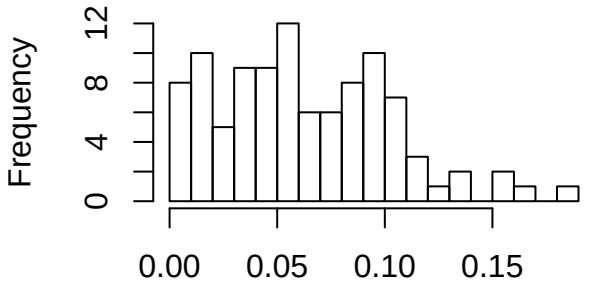

Frequency
0
20
40
0
50
100
200
Median estimates for m0

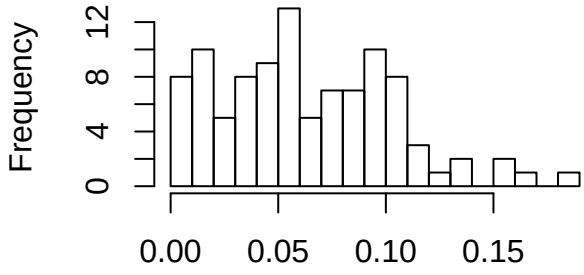

Frequency
0
10
25
0
50
150
250
Mean estimates for m0

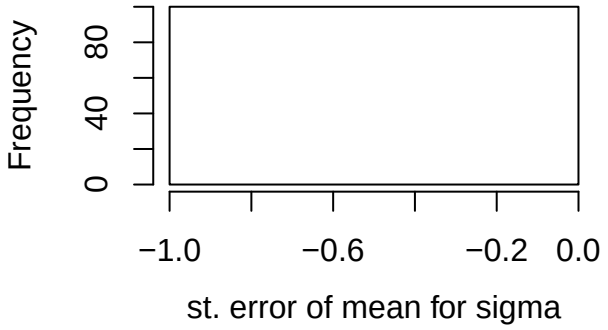

Frequency
0
20
40
0
5
10
15
20
25
st. error of mean for m0

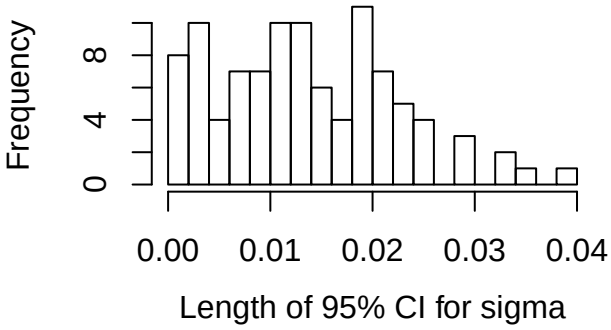

Frequency
0
20
0
200
400
600
800
Length of 95% CI for m0

sigma

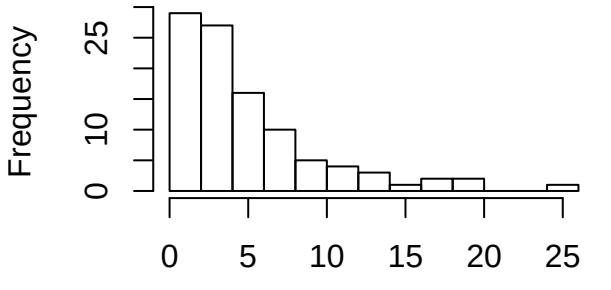

Frequency
0
4
8
12
0.00
0.05
0.10
0.15
Median estimates for sigma

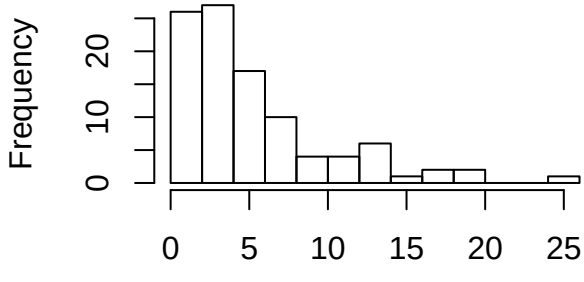

Frequency
0
4
8
12
0.00
0.05
0.10
0.15
Mean estimates for sigma

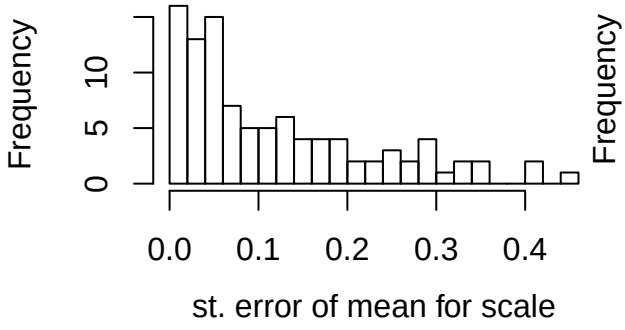

Frequency
0
40
80
−1.0
−0.6
−0.2
0.0
st. error of mean for sigma

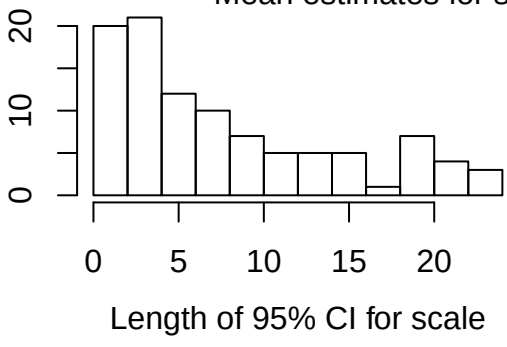

Frequency
0
4
8
0.00
0.01
0.02
0.03
0.04
Length of 95% CI for sigma

scale

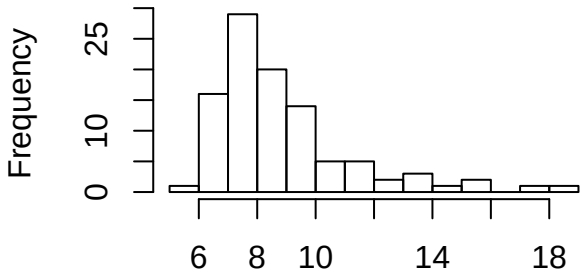

Frequency
0
10
25
0
5
10
15
20
25
Median estimates for scale

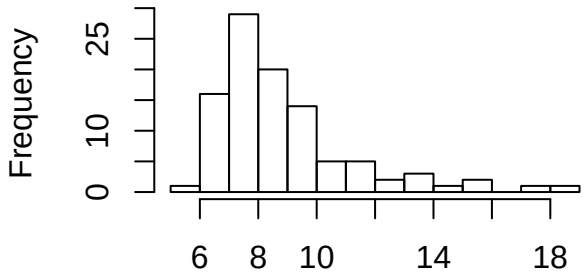

Frequency
0
10
20
0
5
10
15
20
25
Mean estimates for scale

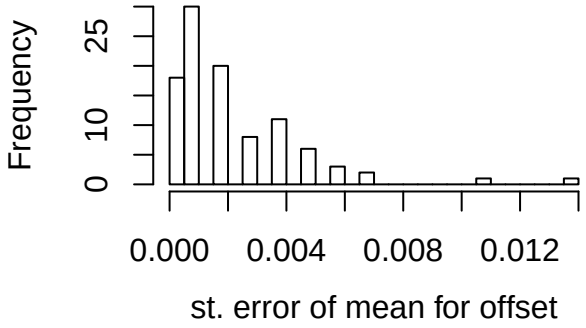

Frequency
0
5
10
0.0
0.1
0.2
0.3
0.4
st. error of mean for scale

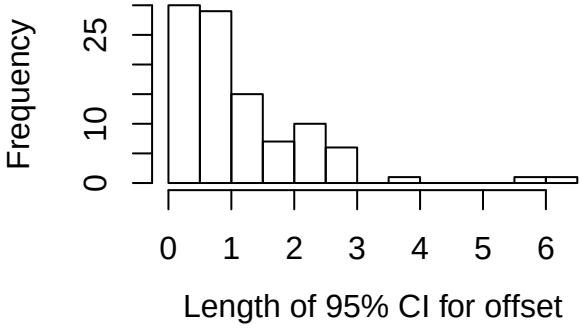

Frequency
0
10
20
0
5
10
15
20
Length of 95% CI for scale

offset

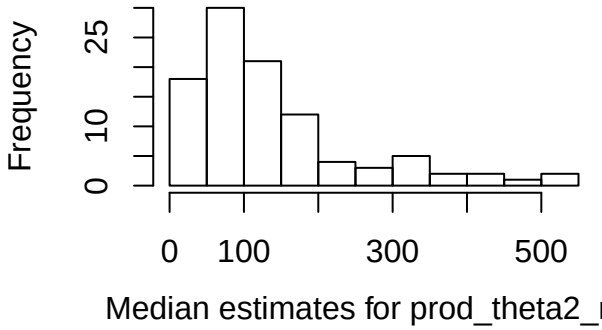


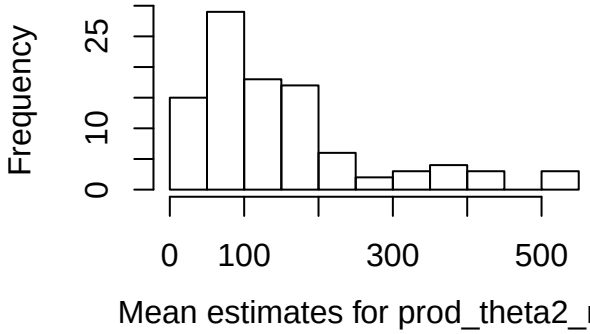


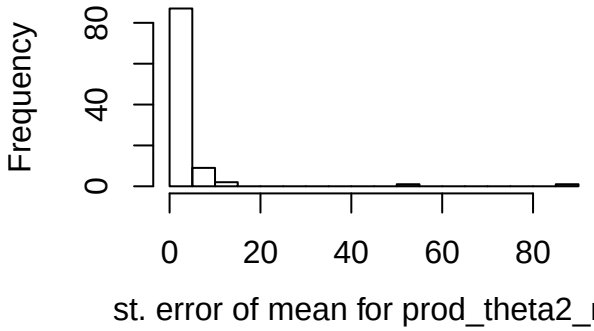


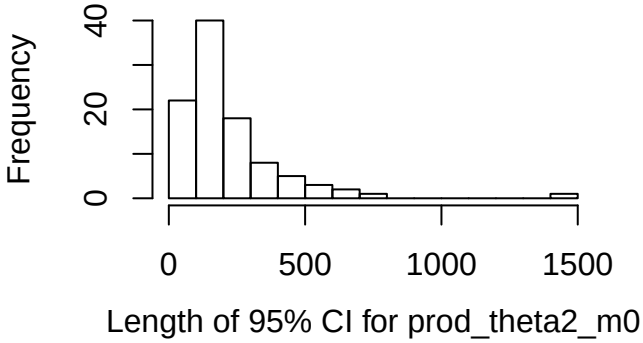


prod_theta2_m0

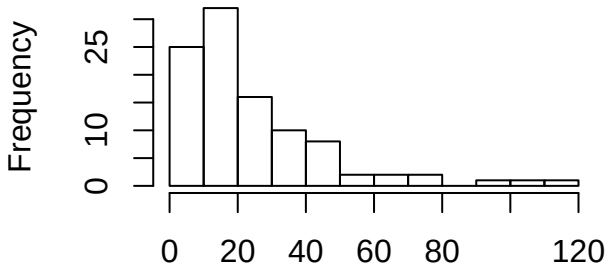


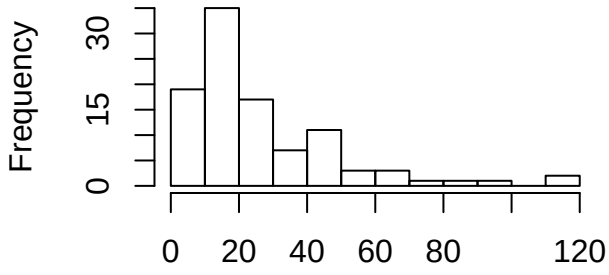


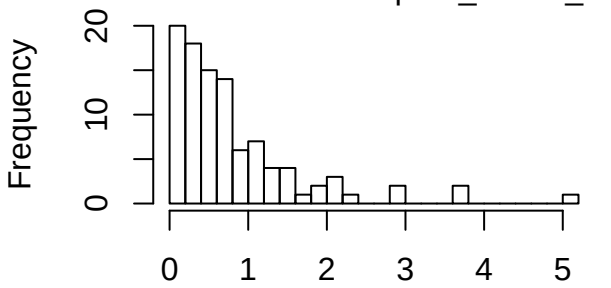


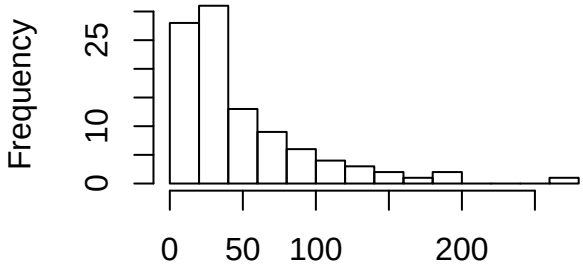


prod_theta2_scale

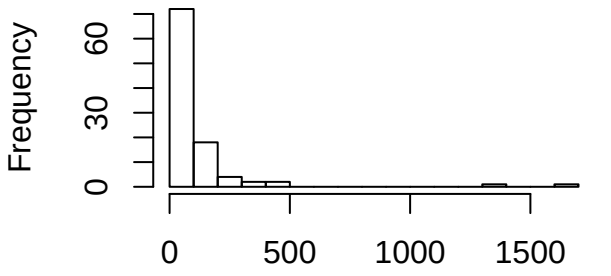


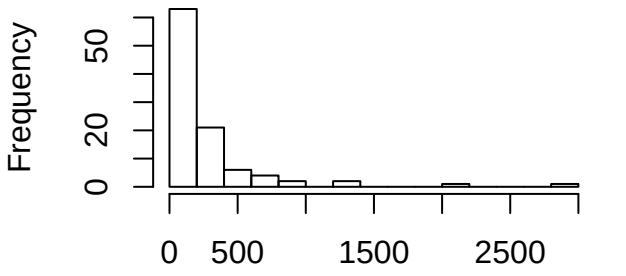


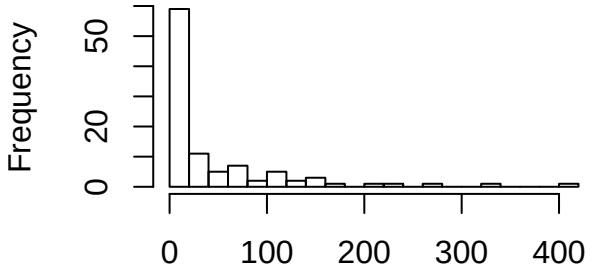


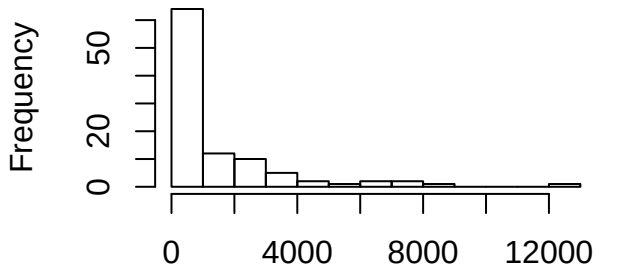


prod_m0_scale

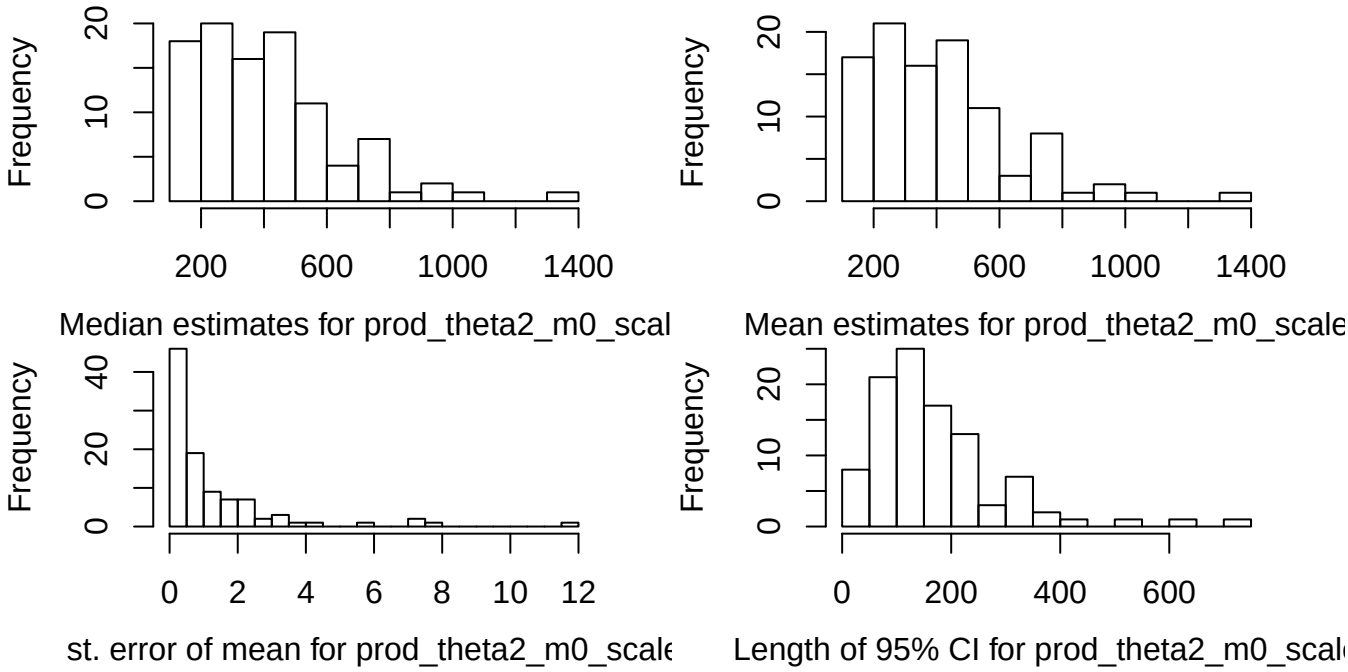




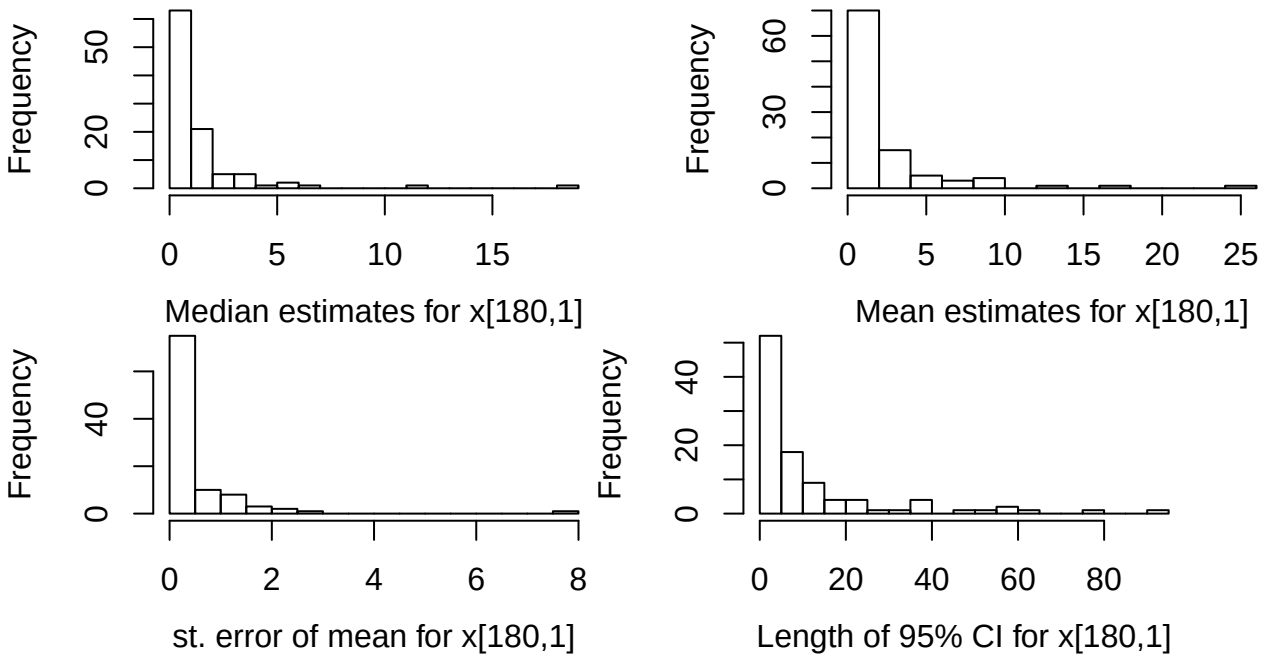




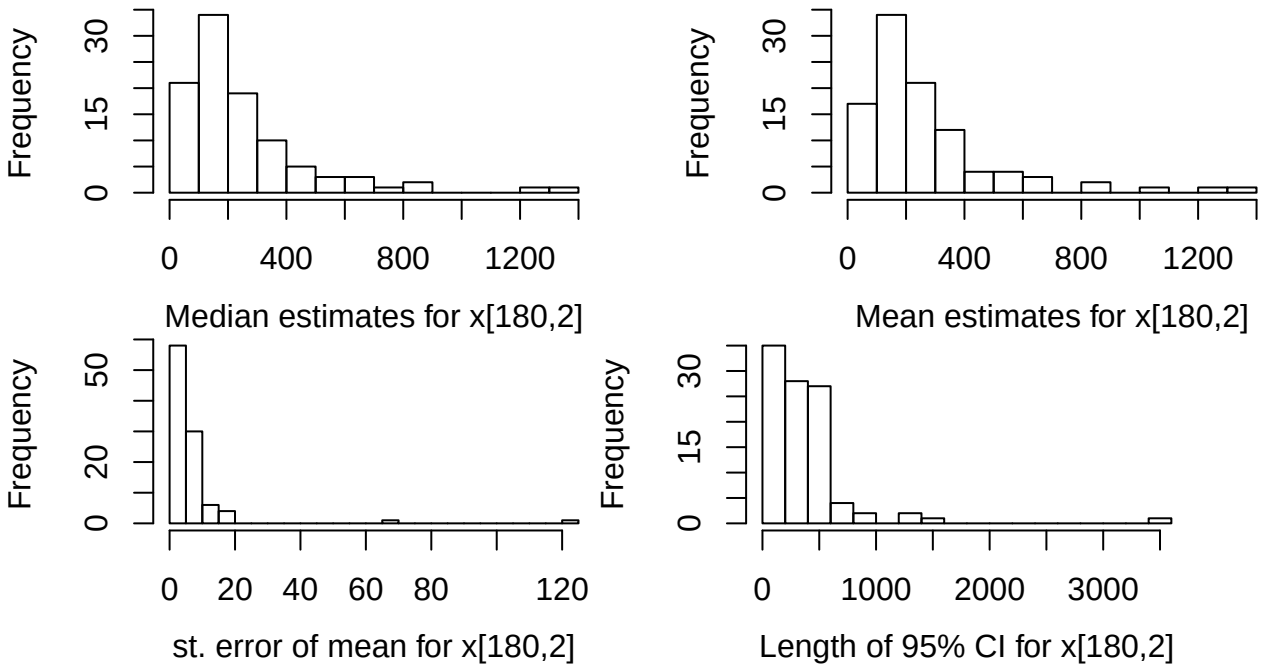
prod_theta2_m0_scale



x[180,1]



x[180,2]


Frequency
0
15
30
0
400
800
1200
Median estimates for x[180,2]
Frequency
0
15
30
0
400
800
1200
Mean estimates for x[180,2]
Frequency
0
20
50
0
20
40
60
80
120
st. error of mean for x[180,2]
Frequency
0
15
30
0
1000
2000
3000
Length of 95% CI for x[180,2]

Summary of length of 95% credible intervals (CIs)

Here we give the median, standard deviation (sd), and coefficient of variation (cv) of the length of the 95% CIs.

For simulated data (where the true parameter values are known), we also give the number of times that the CI covers the true value and median, sd, and cv of the length of those 95% CIs that cover the true value.

	median_l_CI	sd_l_CI	cv_l_CI
theta[1]	0.115	0.039	0.318
theta[2]	11.613	1.733	0.155
theta[3]	0.067	0.042	0.591
m0	76.558	205.436	1.094
sigma	0.013	0.009	0.609
scale	5.514	6.588	0.842
offset	0.788	1.077	0.956
prod_theta2_m0	172.022	194.621	0.892
prod_theta2_scale	34.956	47.579	0.943
prod_m0_scale	482.870	2205.642	1.545
prod_theta2_m0_scale	145.181	120.006	0.694
x[180,1]	4.546	17.059	1.434
x[180,2]	310.450	405.595	1.053

The following table shows the values of the median of *the length of the CIs divided by the median of each sample*

$$m_1 = \text{median}\left(\frac{q_i(0.975) - q_i(0.025)}{q_i(0.5)}\right),$$

the median of *the length of the CIs divided by the mean of each sample*

$$m_1 = \text{median}\left(\frac{q_i(0.975) - q_i(0.025)}{sample\_mean}\right),$$

as well as the median of the length of the CIs divided by *the median of the medians of the sample*

$$m_3 = \frac{\text{median}(q_i(0.975) - q_i(0.025))}{\text{median}(q_i(0.5))}.$$

and (if applicable) the median of *the length of the CIs divided by the true value*

$$m_4 = \frac{\text{median}(q_i(0.975) - q_i(0.025))}{\text{true value}}.$$

	m_1	m_2	m_3
theta[1]	1.07	1.05	1.11
theta[2]	2.15	2.03	2.14
theta[3]	0.74	0.72	0.75
m0	3.65	2.78	3.59
sigma	0.22	0.22	0.22
scale	1.61	1.49	1.56
offset	0.10	0.10	0.09
prod_theta2_m0	1.59	1.49	1.66
prod_theta2_scale	2.19	2.02	2.14
prod_m0_scale	5.99	3.71	6.86
prod_theta2_m0_scale	0.39	0.39	0.38
x[180,1]	5.91	3.87	5.94
x[180,2]	1.61	1.51	1.71