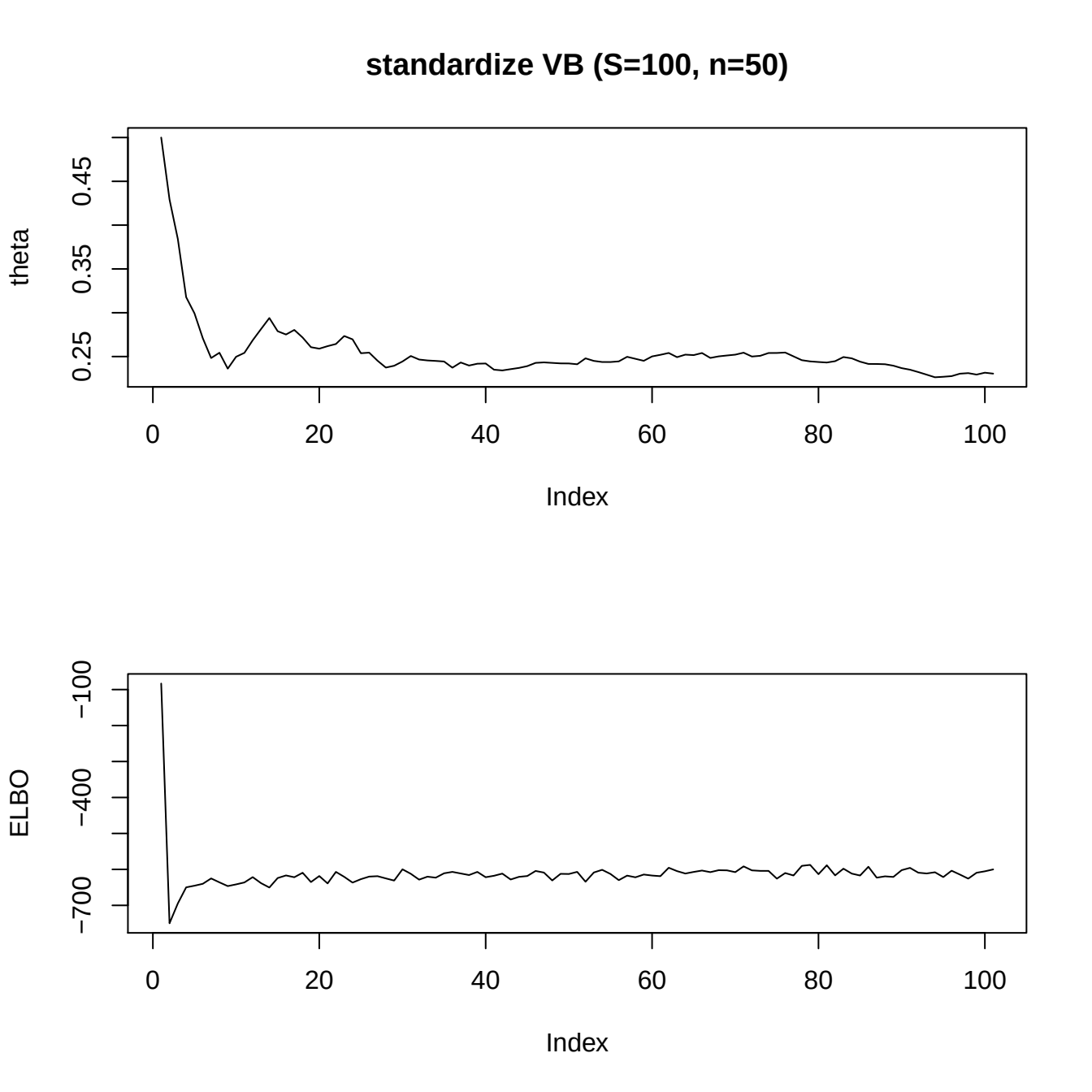
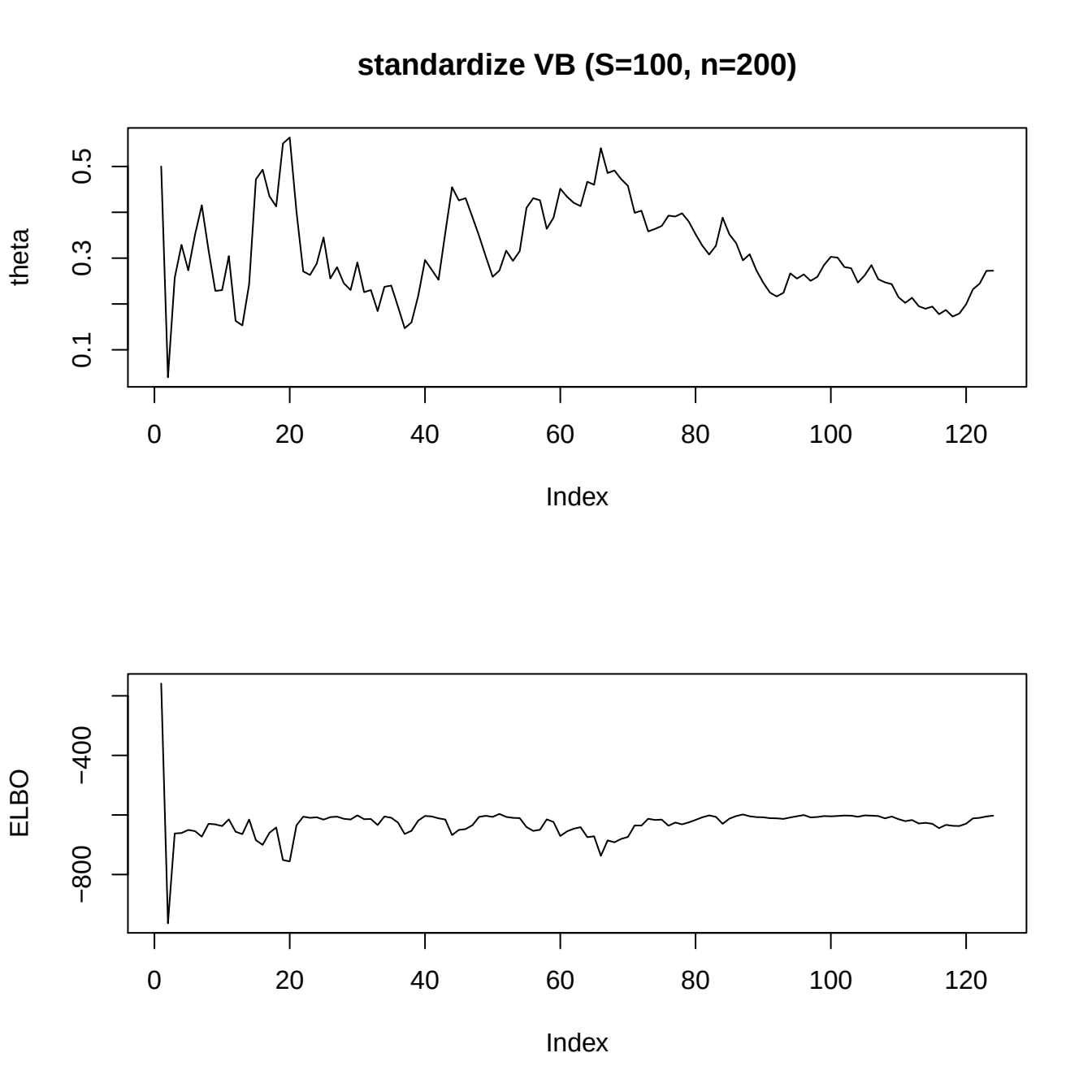
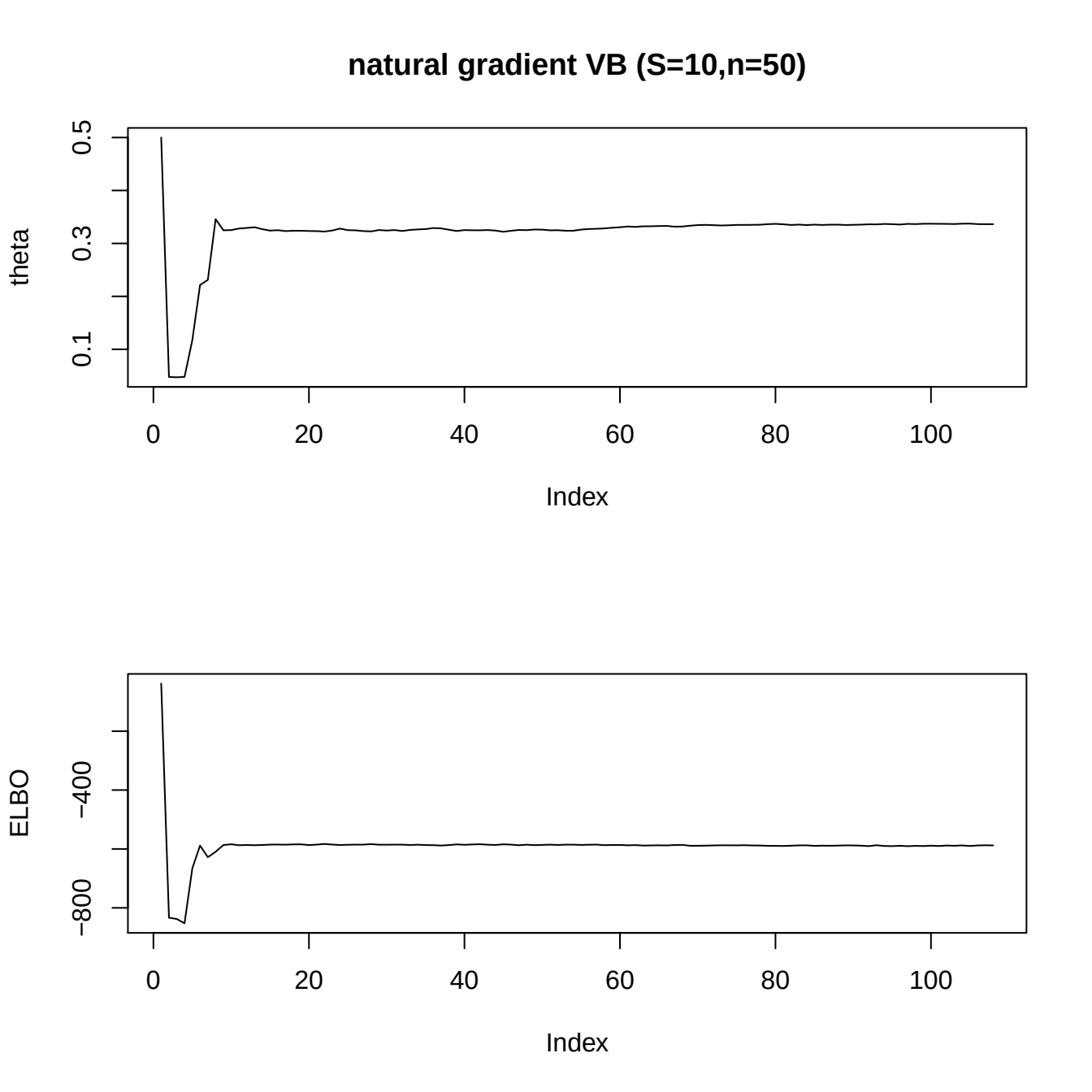
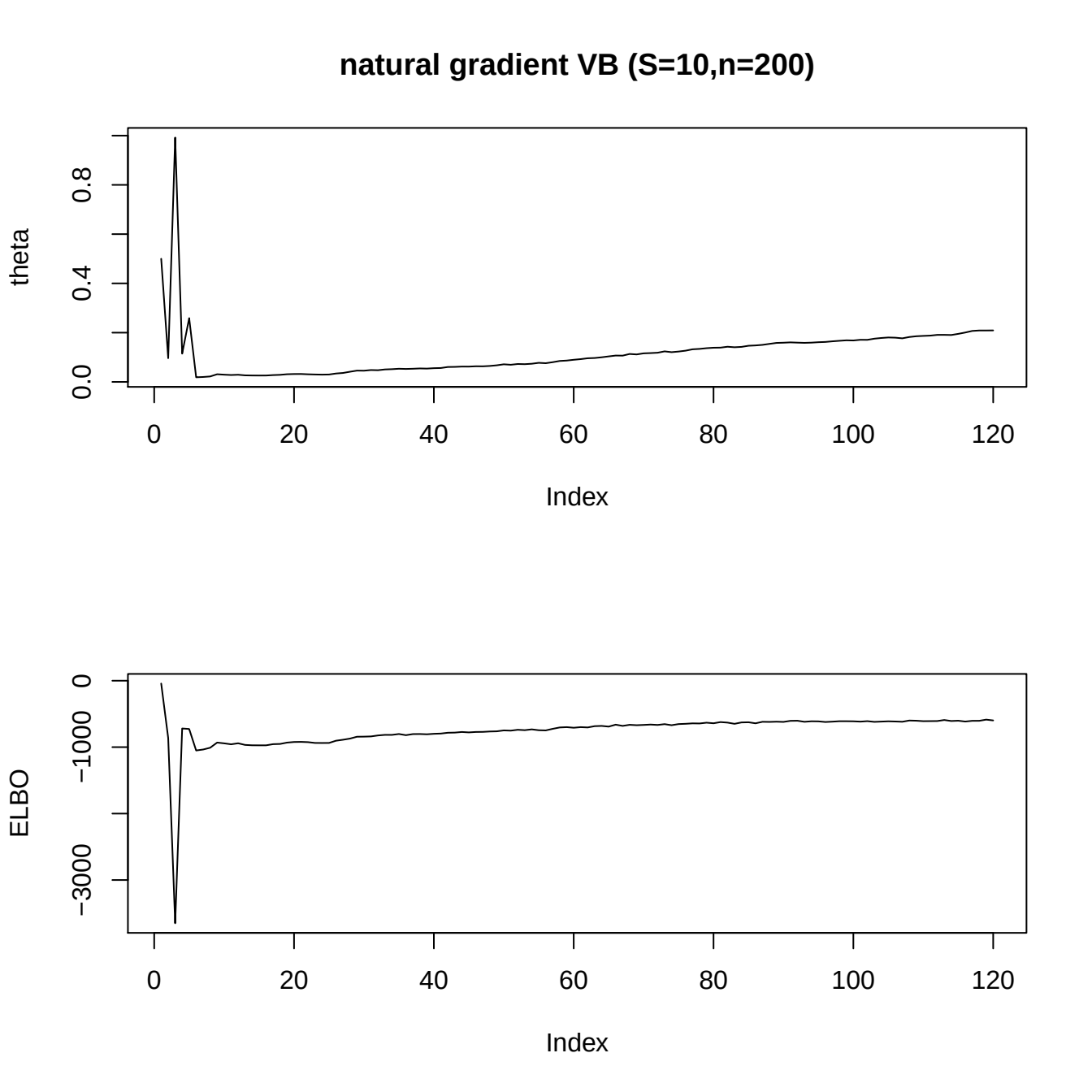
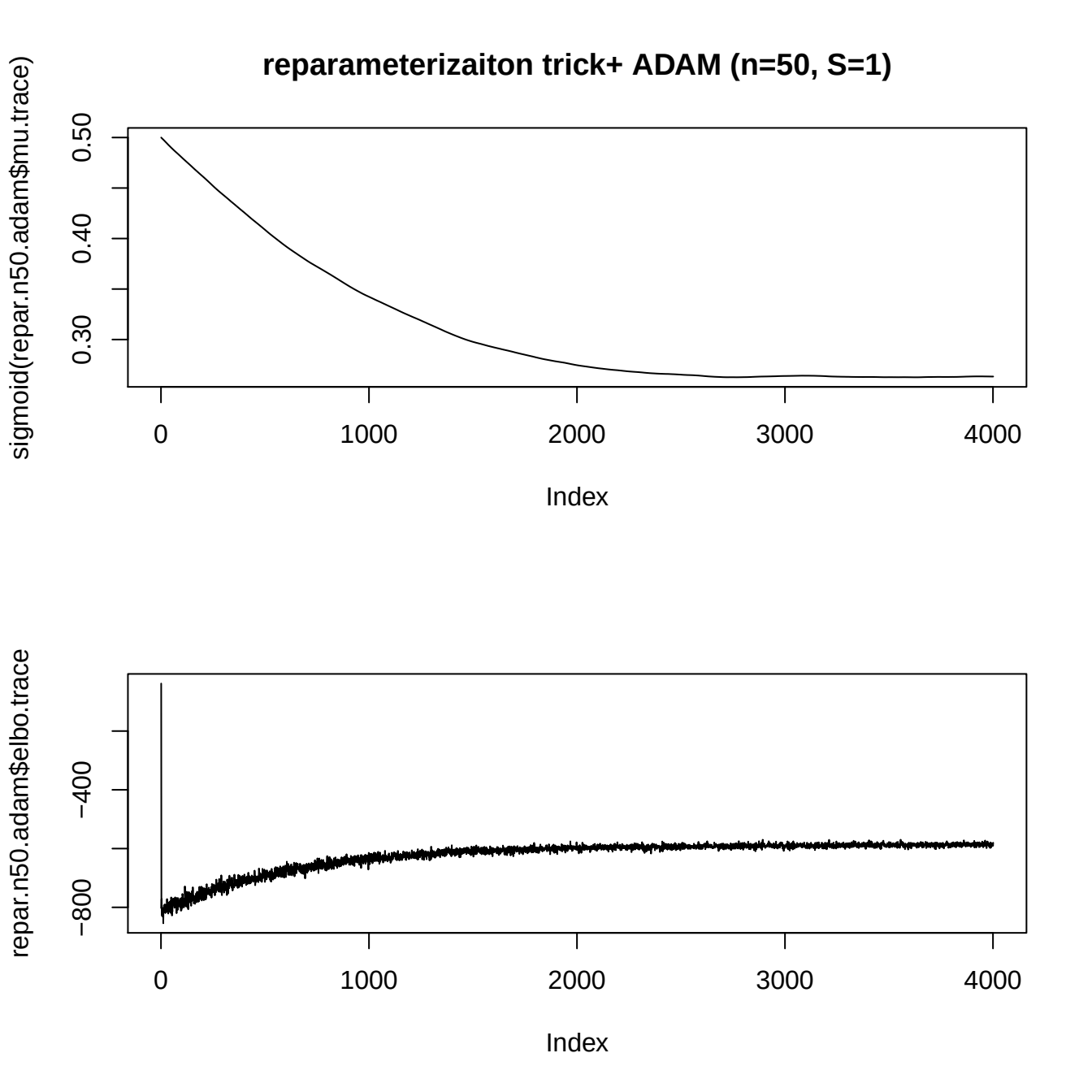
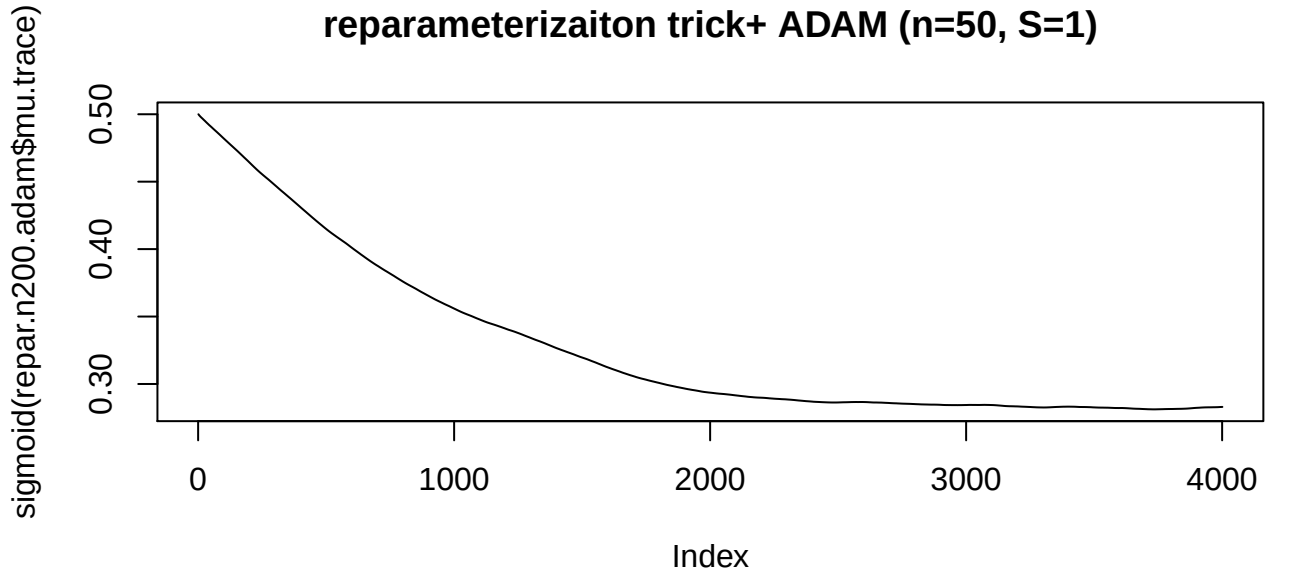

standardize VB (S=100, n=50)
theta
0.25
0.35
0.45
0
20
40
60
80
100
Index
ELBO
−700
−400
−100
0
20
40
60
80
100
Index

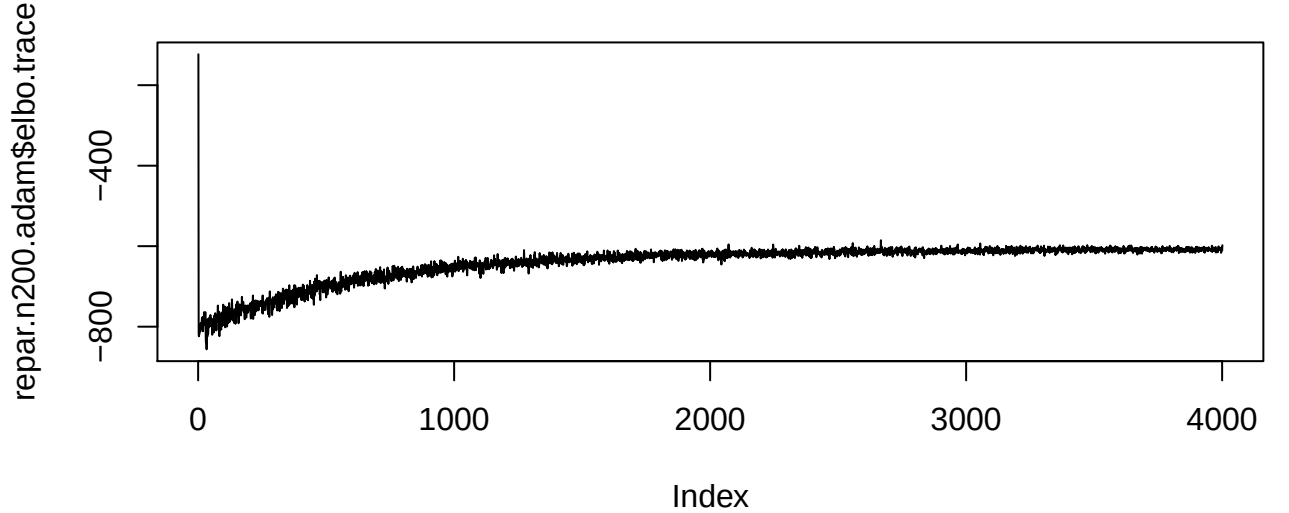

standardize VB (S=100, n=200)
theta
0.1
0.3
0.5
0
20
40
60
80
100
120
Index
ELBO
−800
−400
0
20
40
60
80
100
120
Index

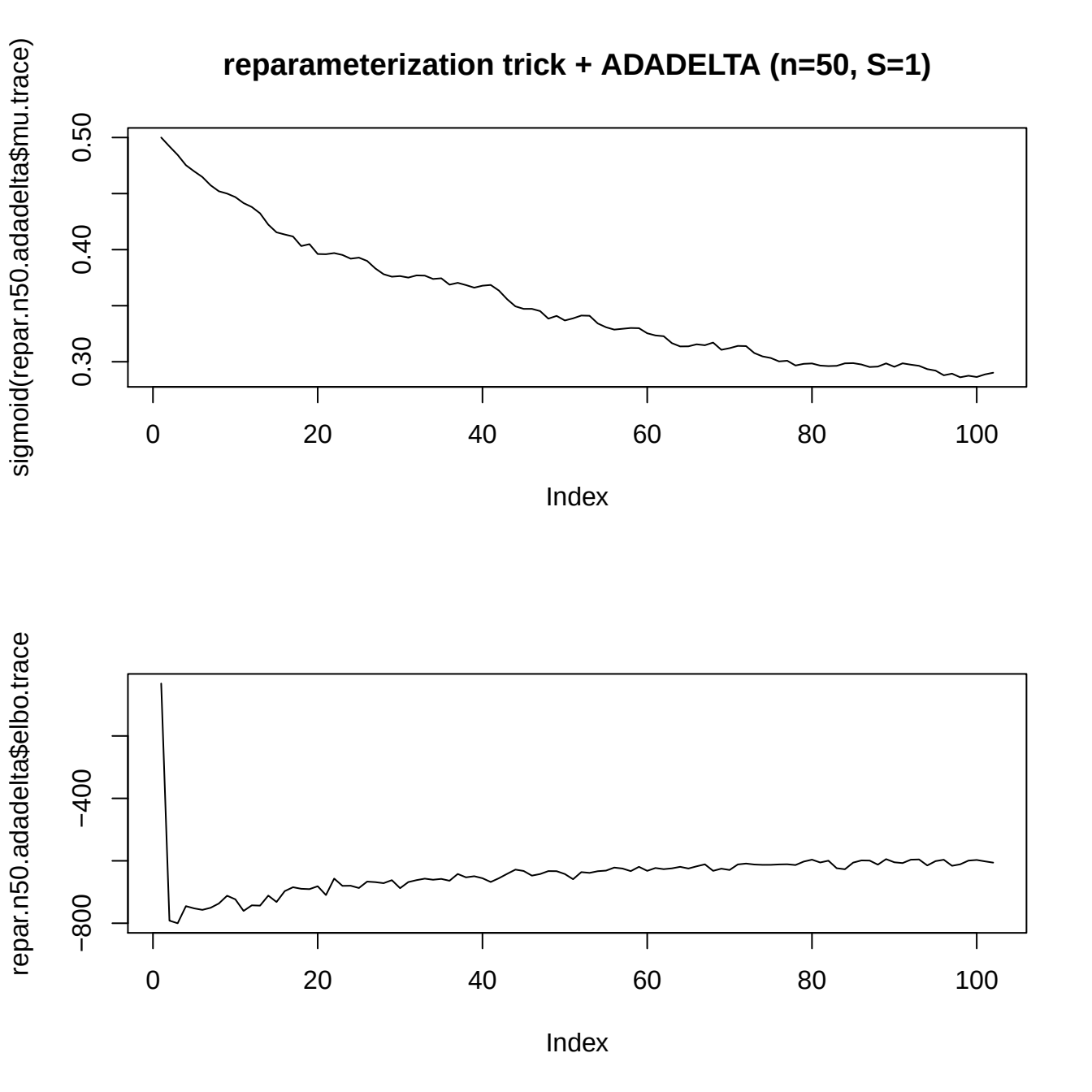

natural gradient VB (S=10,n=50)
theta
0.1
0.3
0.5
0
20
40
60
80
100
Index
ELBO
−800
−400
0
20
40
60
80
100
Index

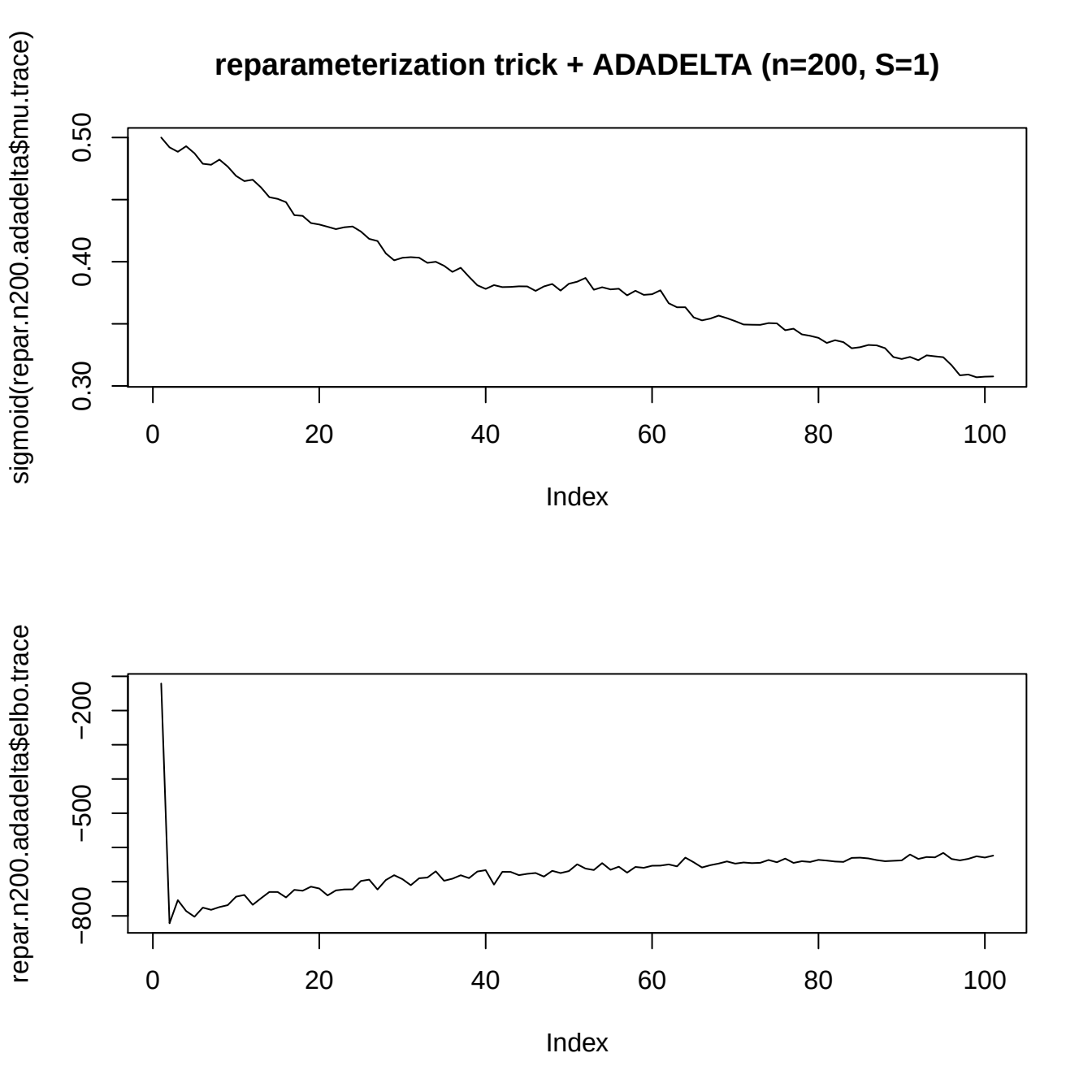

natural gradient VB (S=10,n=200)
theta
0.0
0.4
0.8
0
20
40
60
80
100
120
Index
ELBO
−3000
−1000
0
0
20
40
60
80
100
120
Index

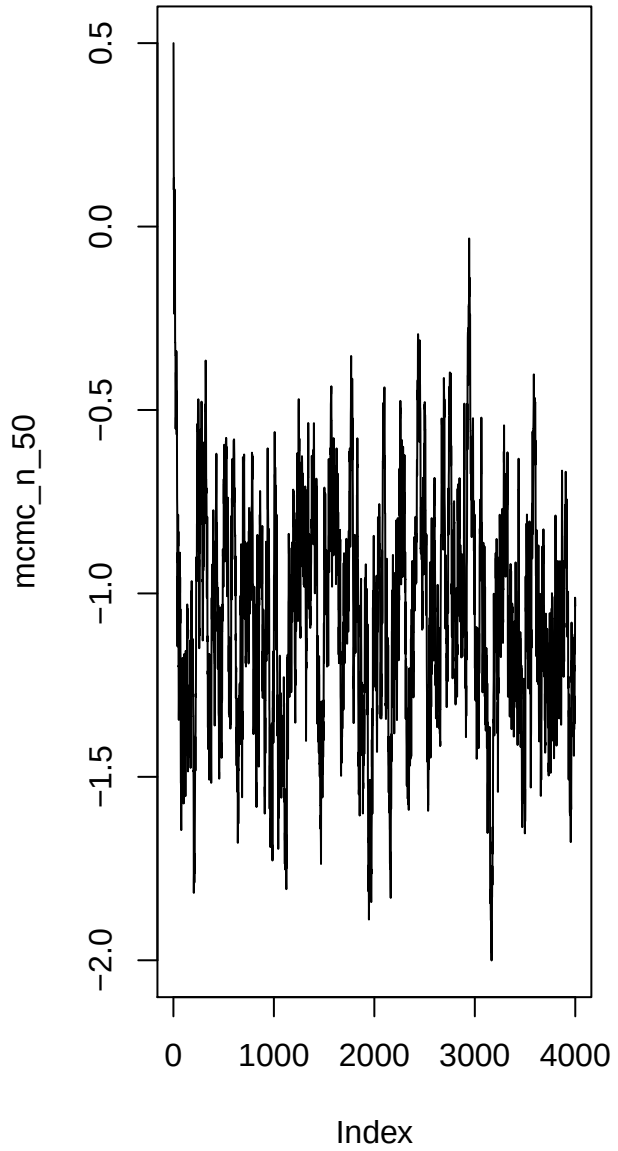

reparameterizaiton trick+ ADAM (n=50, S=1)
sigmoid(repar.n50.adam$mu.trace)
0.30
0.40
0.50
0
1000
2000
3000
4000
Index
repar.n50.adam$elbo.trace
−800
−400
0
1000
2000
3000
4000
Index

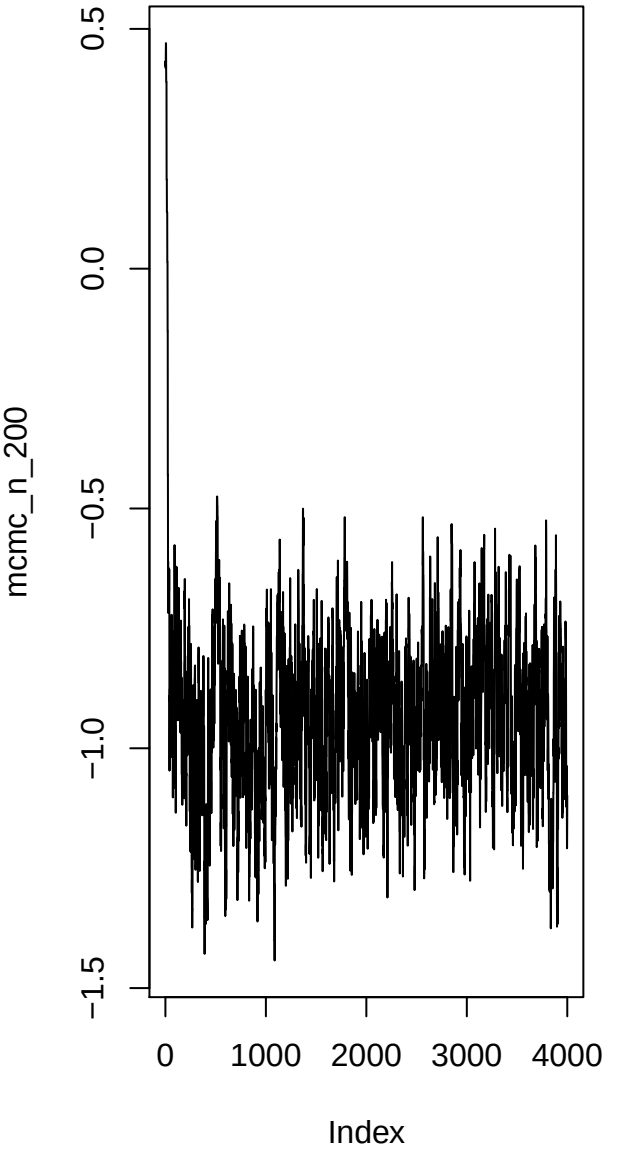

reparameterizaiton trick+ ADAM (n=50, S=1)
sigmoid(repar.n200.adam$mu.trace)
0.30
0.40
0.50
0
1000
2000
3000
4000
Index

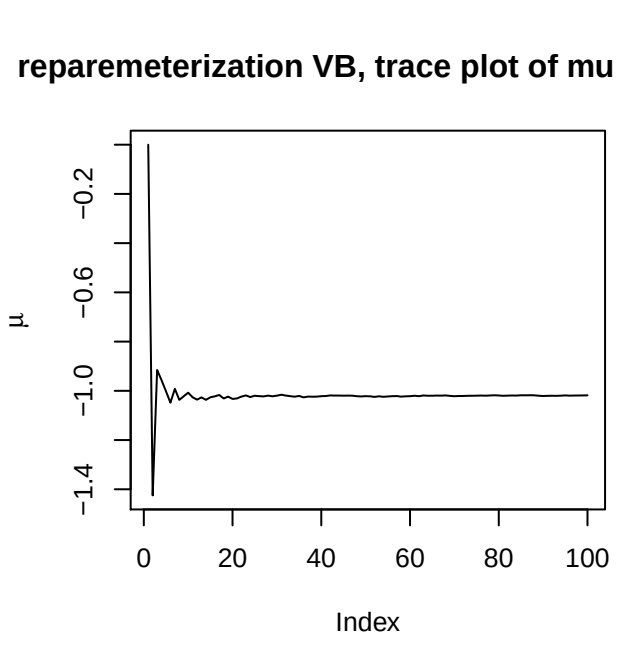

repar.n200.adam$elbo.trace
−800
−400
0
1000
2000
3000
4000
Index

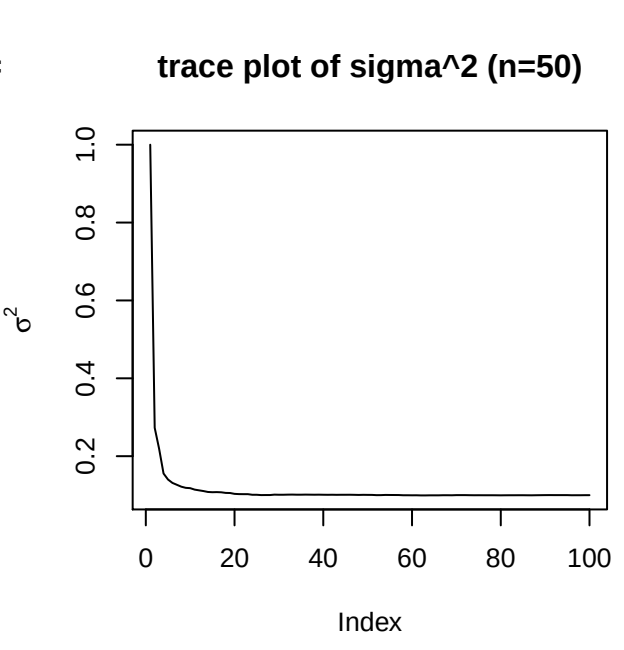

reparameterization trick + ADADELTA (n=50, S=1)
sigmoid(repar.n50.adadelta$mu.trace)
0.30
0.40
0.50
0
20
40
60
80
100
Index
repar.n50.adadelta$elbo.trace
−800
−400
0
20
40
60
80
100
Index

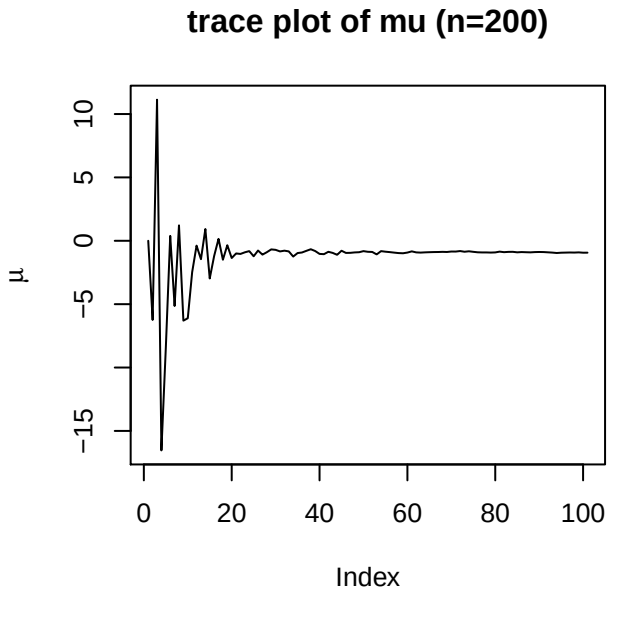

reparameterization trick + ADADELTA (n=200, S=1)
sigmoid(repar.n200.adadelta$mu.trace)
0.30
0.40
0.50
0
20
40
60
80
100
Index
repar.n200.adadelta$elbo.trace
−800
−500
−200
0
20
40
60
80
100
Index

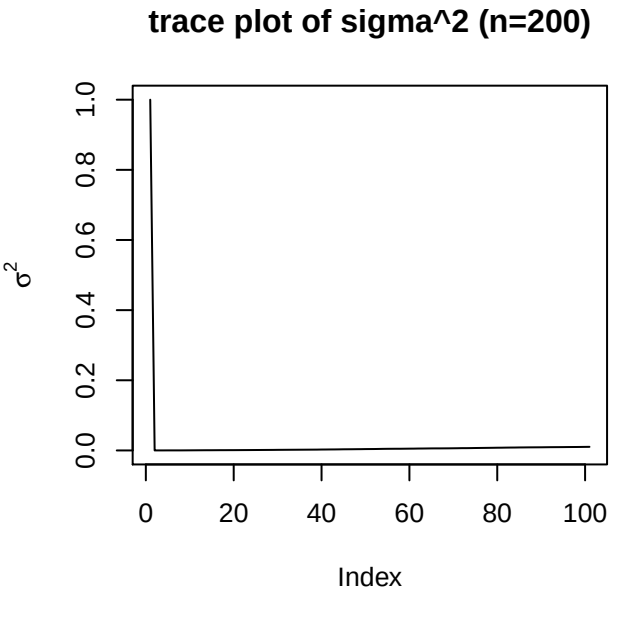

mcmc_n_50
0.5
0.0
−0.5
−1.0
−1.5
−2.0
0
1000
2000
3000
4000
Index

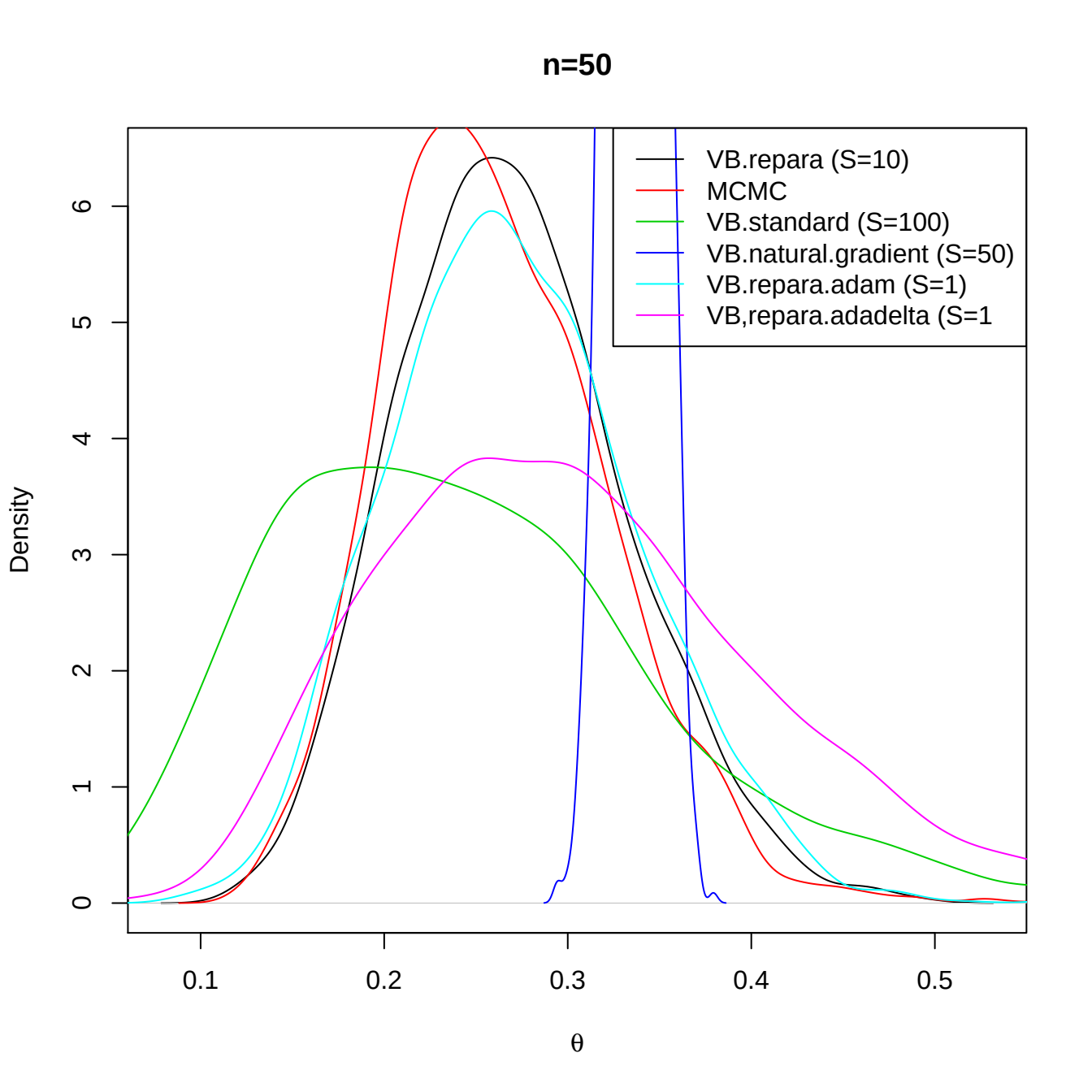

mcmc_n_200
0.5
0.0
−0.5
−1.0
−1.5
0
1000
2000
3000
4000
Index

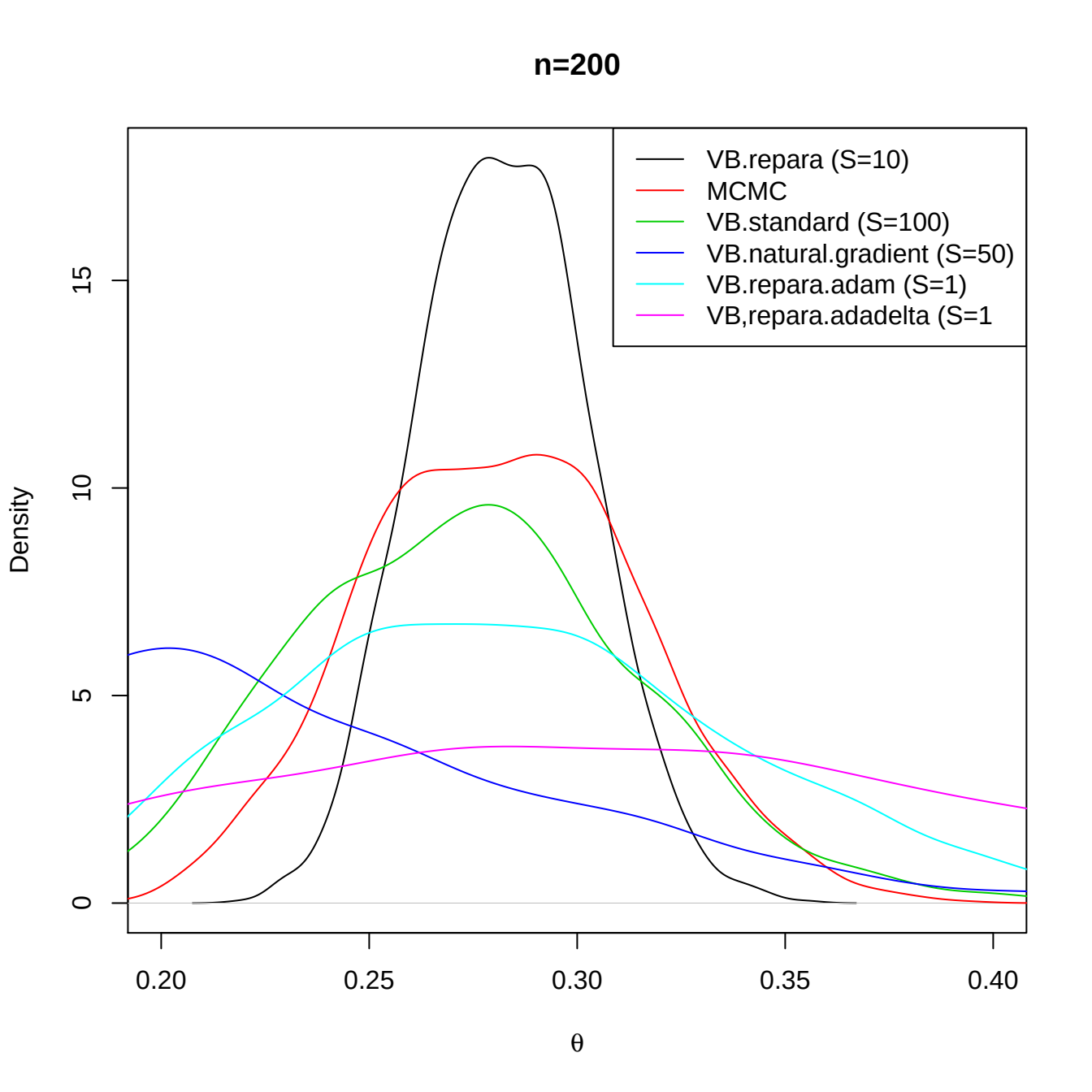

reparemeterization VB, trace plot of mu (n=
μ
−0.2
−0.6
−1.0
−1.4
0
20
40
60
80
100
Index


trace plot of sigma^2 (n=50)
σ2
0.2
0.4
0.6
0.8
1.0
0
20
40
60
80
100
Index


trace plot of mu (n=200)
μ
10
5
0
−5
−15
0
20
40
60
80
100
Index


trace plot of sigma^2 (n=200)
σ2
0.0
0.2
0.4
0.6
0.8
1.0
0
20
40
60
80
100
Index


n=50
VB.repara (S=10)
MCMC
VB.standard (S=100)
VB.natural.gradient (S=50)
VB.repara.adam (S=1)
VB,repara.adadelta (S=1
Density
0
1
2
3
4
5
6
0.1
0.2
0.3
0.4
0.5
θ


n=200
VB.repara (S=10)
MCMC
VB.standard (S=100)
VB.natural.gradient (S=50)
VB.repara.adam (S=1)
VB,repara.adadelta (S=1
Density
0
5
10
15
0.20
0.25
0.30
0.35
0.40
θ