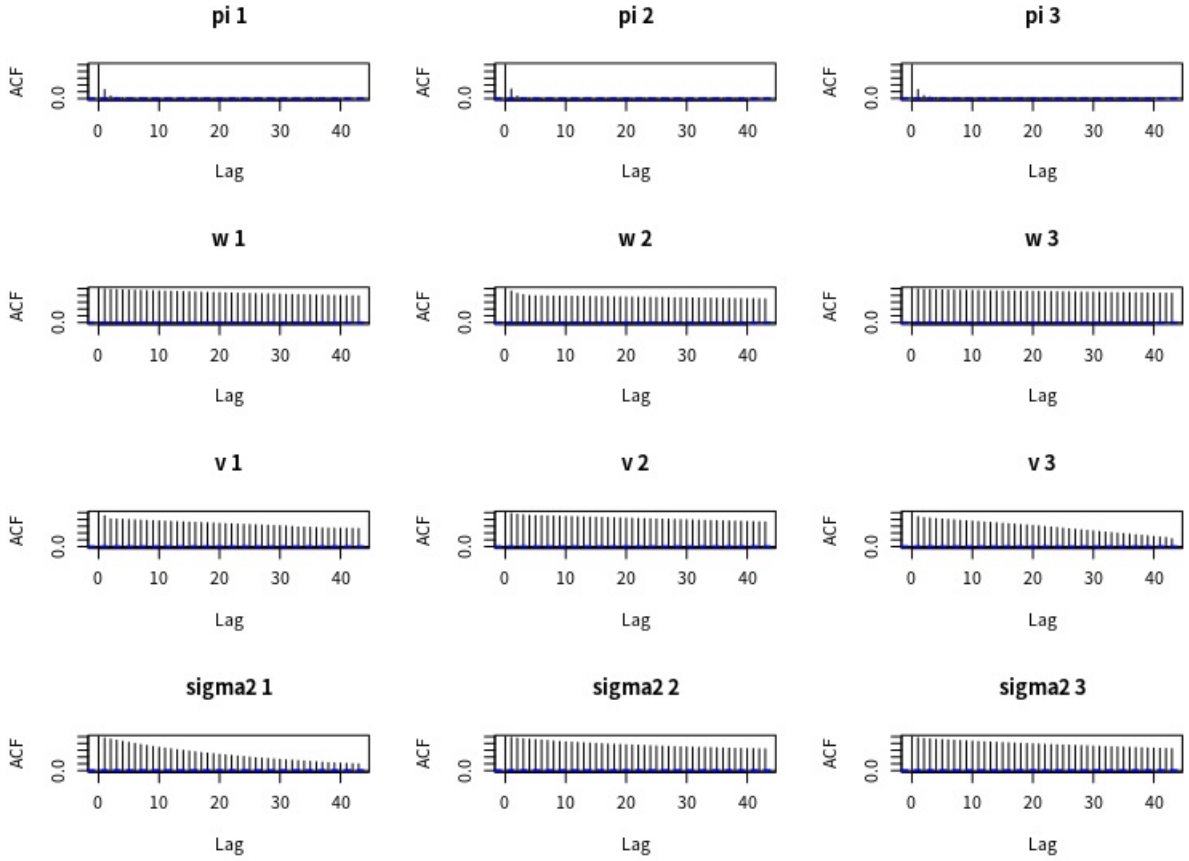
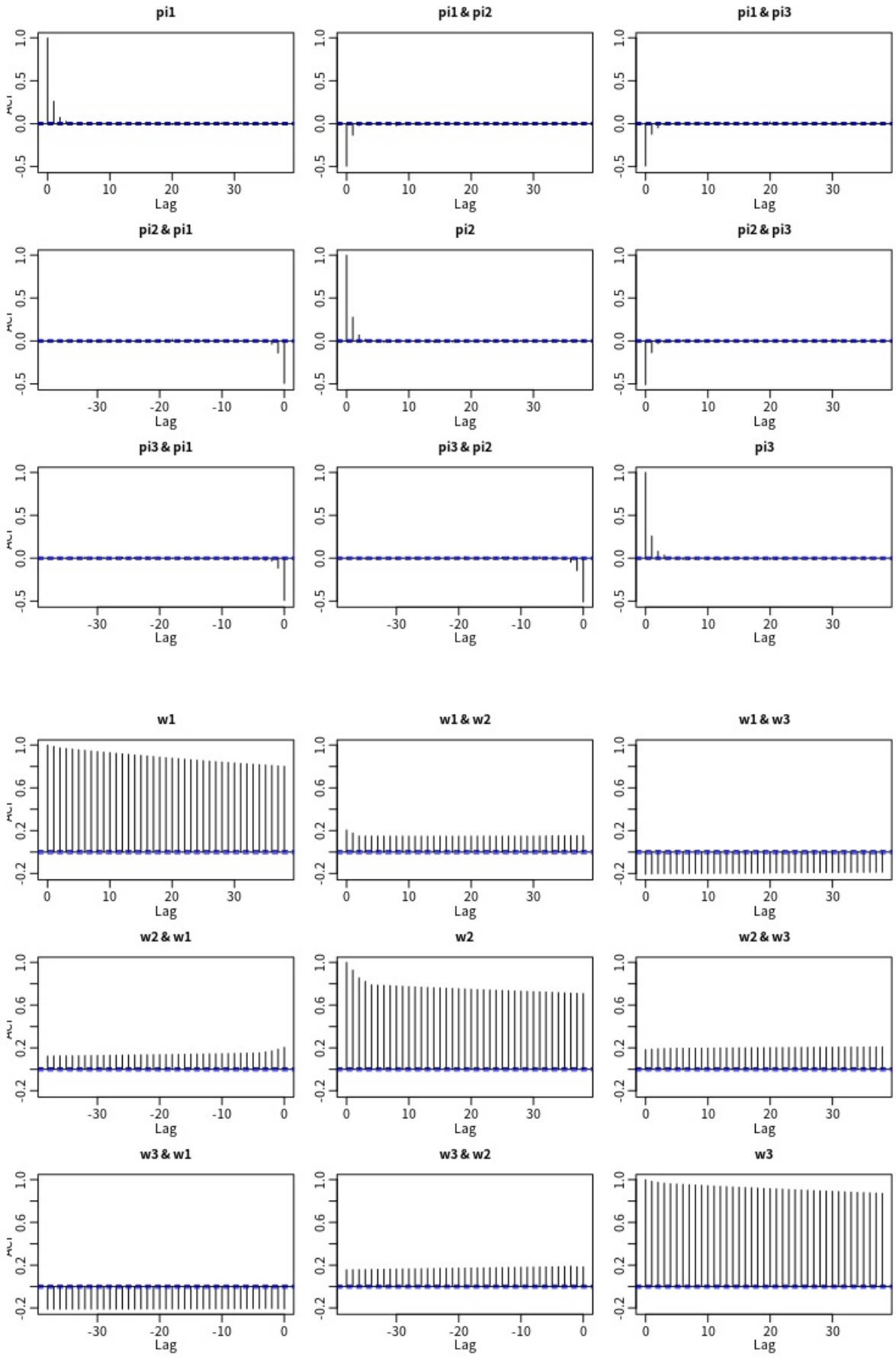
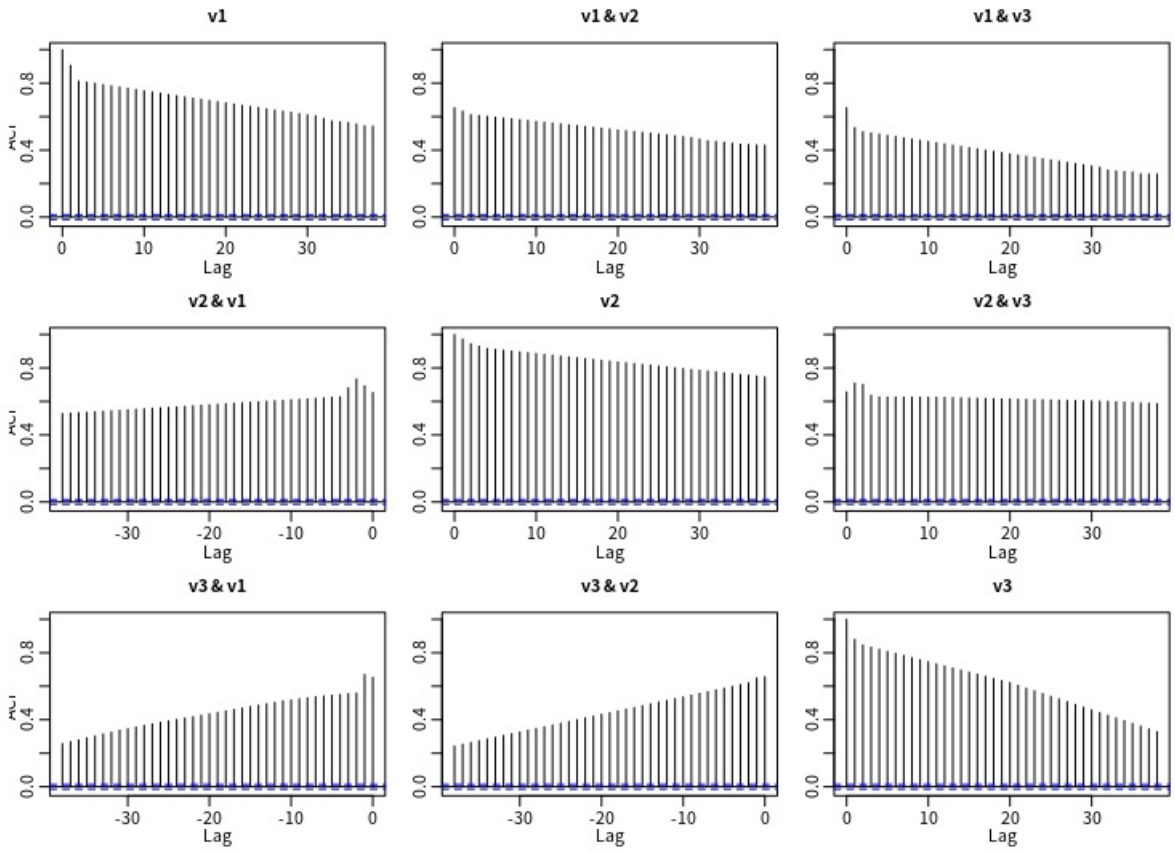
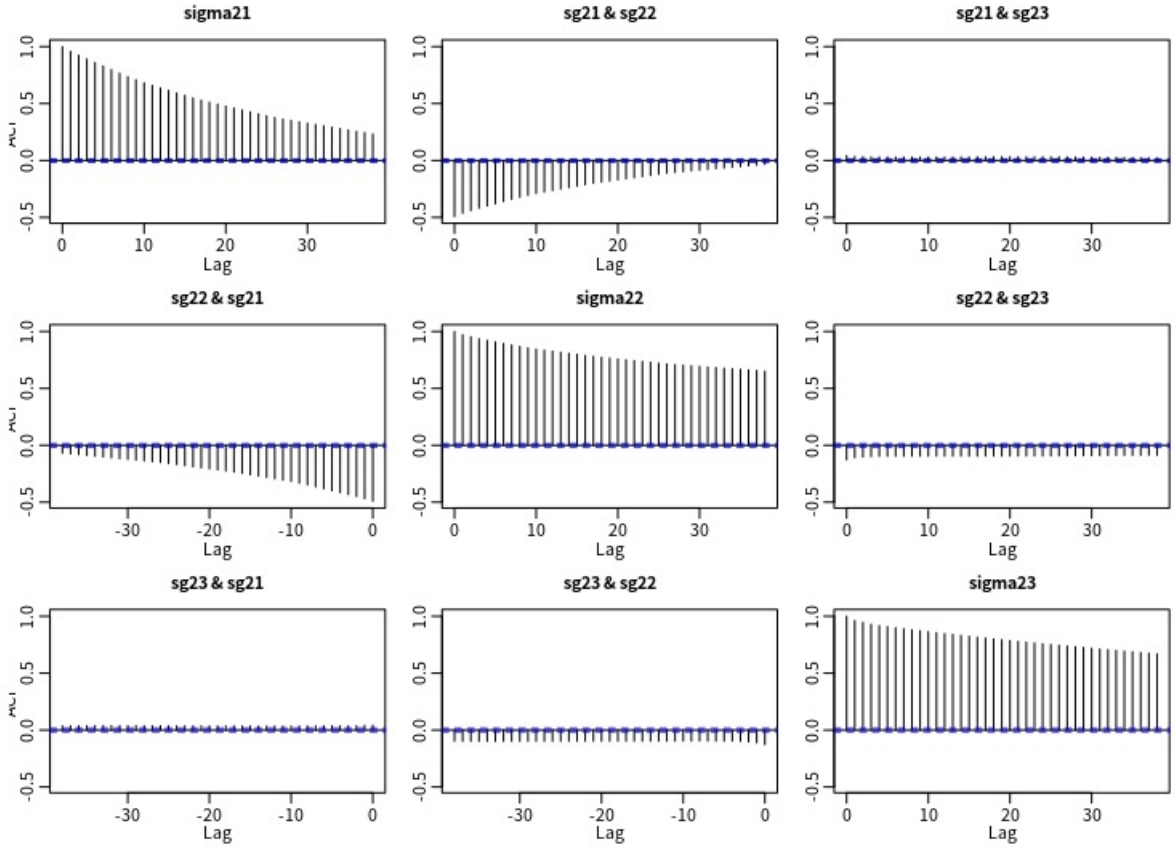
说明（使用原来的数据）

- 迭代的自相关系数退化得很慢，见https://nicercode.github.io/guides/mcmc/，http://sbfnk.github.io/mfiidd/mcmc_diagnostics.html 考虑修改建议分布的参数。




pi1
pi1 & pi2
pi1 & pi3
pi2 & pi1
pi2
pi2 & pi3
pi3 & pi1
pi3 & pi2
pi3
w1
w1 & w2
w1 & w3
w2 & w1
w2
w2 & w3
w3 & w1
w3 & w2
w3
ACF
Lag


v1
v1 & v2
v1 & v3
v2 & v1
v2
v2 & v3
v3 & v1
v3 & v2
v3
ACF
Lag


sigma21
sg21 & sg22
sg21 & sg23
sg22 & sg21
sigma22
sg22 & sg23
sg23 & sg21
sg23 & sg22
sigma23
ACF
Lag

20000 训练结果

训练结果是3类

- z=[1 1 1 0 0 0 2 2 2]
- rmse =0.0434
  rmse.each = [0.0587 0.0251 0.0465]
- corr
  corr.each = [0.9906 0.9981 0.9948]
  -对比原来的方法：

  EM算法

	50 次试验的 RMSE 的平均
mix-GP	0.0850
split-mix-GP	0.0877
mix-GPFR	0.0735
split-mix-GPFR	0.0734↓

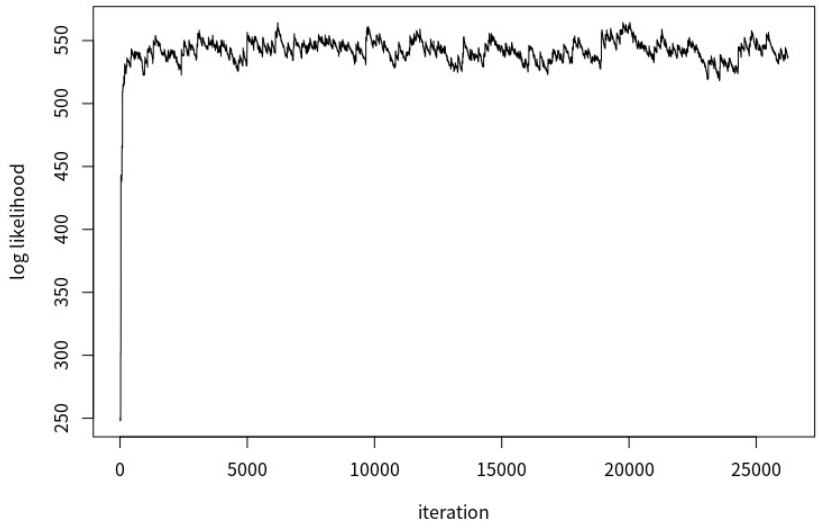
fix MC和变化的MC

表 3.1　真实值和预测值之间的 RMSE 和相关系数 (r)

训练数据：前 9 条曲线上的一半数据 模型：固定分量数目的高斯过程混合回归模型		
测试数据	RMSE	r
第一类 GP	0.2329	0.9485
第二类 GP	0.3612	0.8520
第三类 GP	0.2266	0.9024
第 10 条曲线	0.2037	0.7566
训练数据：前 9 条曲线上的一半数据 模型：变化分量数目的高斯过程混合回归模型		
测试数据	RMSE	r
第一类 GP	0.0602	0.9900
第二类 GP	0.0253	0.9982
第三类 GP	0.0645	0.9867
第 10 条曲线	0.0493	0.9820

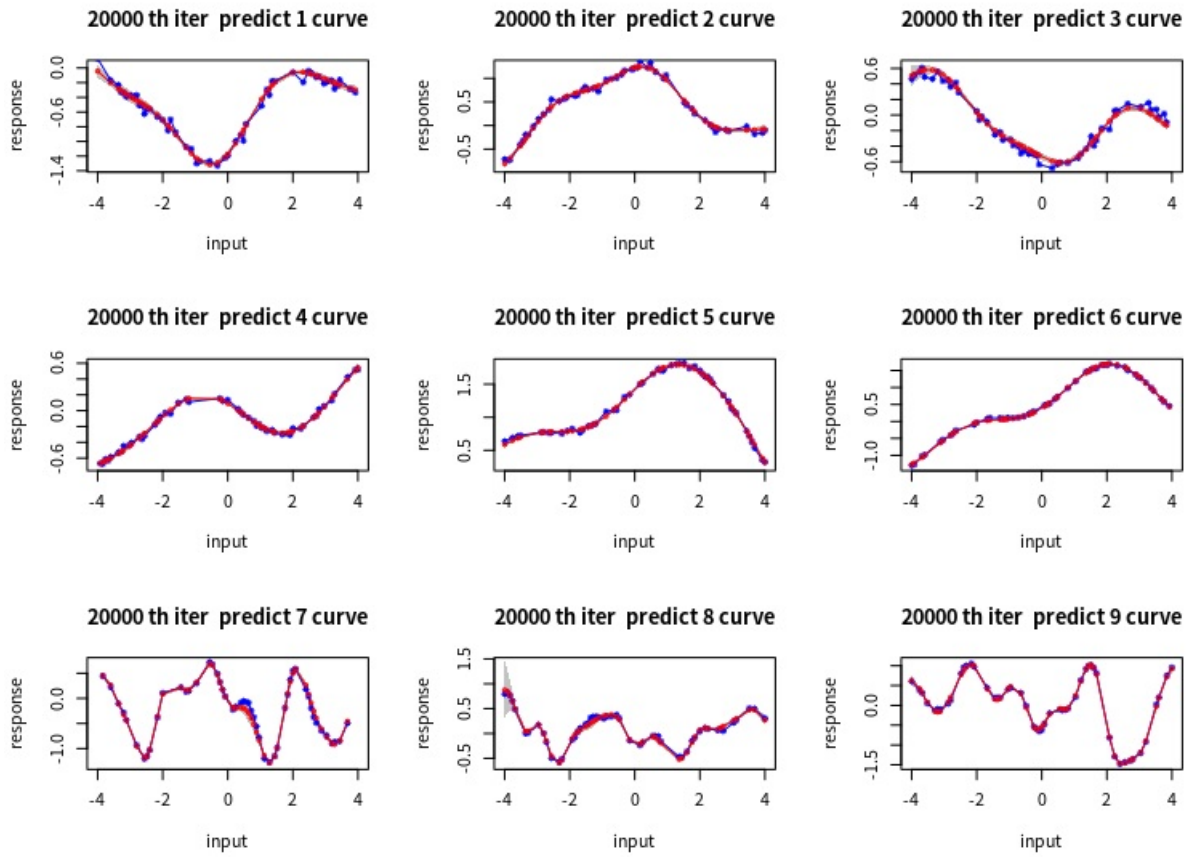
rmse全部变小 ,相关性除第二类和之前的方法差不多，第一类和第三类相关性变大。

- log likelihood



迭代过程中似然在朝着增大的方向变化。

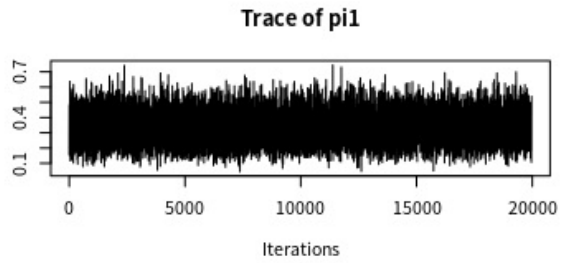
- 预测结果

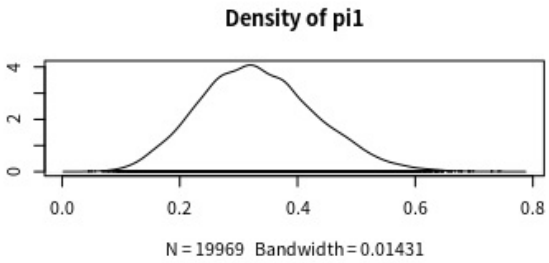


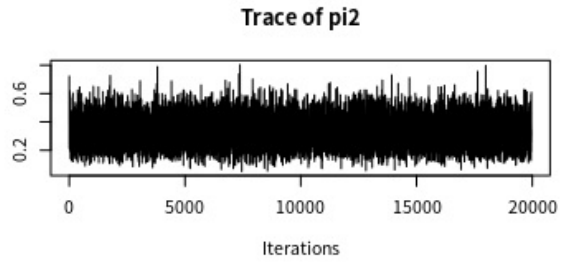
-参数的收敛过程

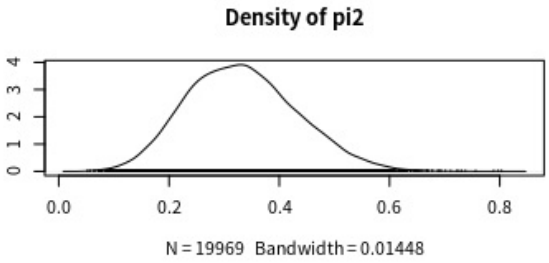
π = [1/3,1/3,1/3]

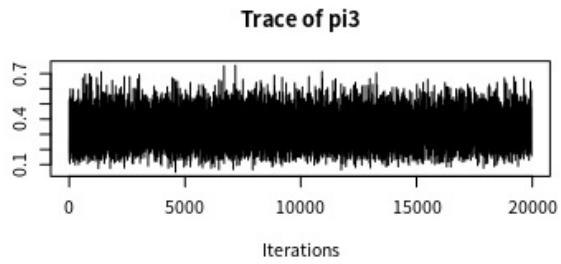
计算结果的均值[0.33 0.33 0.33]

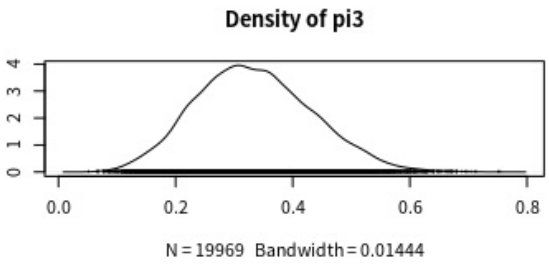










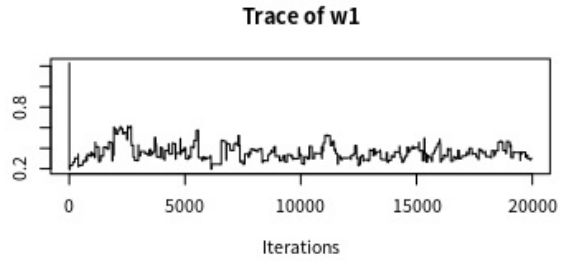


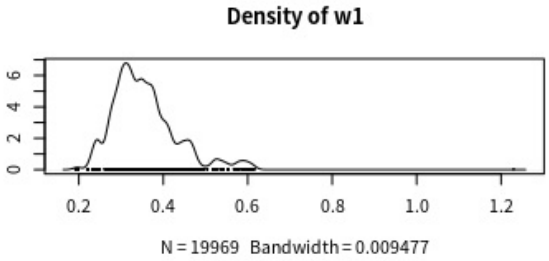
w= [0.5 1.0 10]

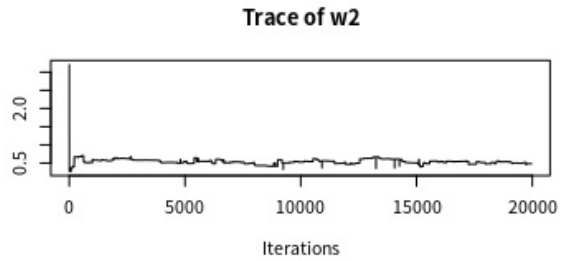
计算结果的均值[0.3557 0.5397 7.7200]

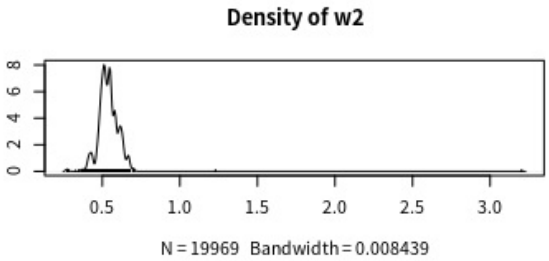
众数[0.2451 0.5800 6.9631]

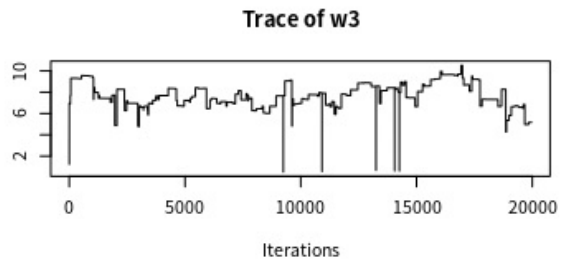
中位数=[0.3438 0.5362 7.6531]
中位数和均值差不多，比众数更加接近真实值

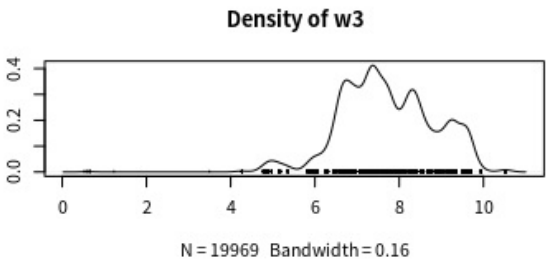












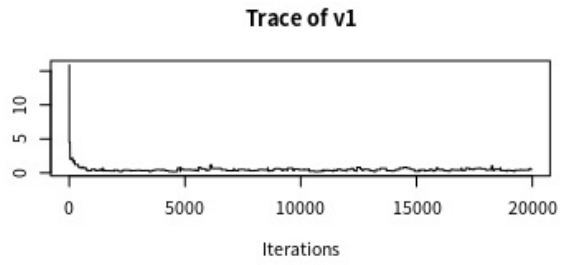
v=[1.0 0.2 0.2]

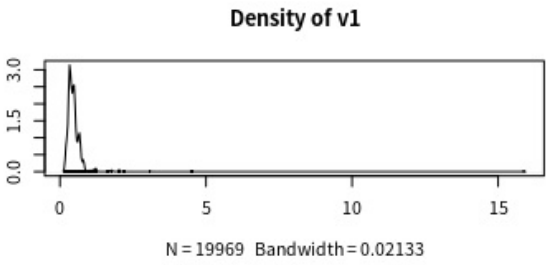
计算结果的均值[0.4759 0.3513 0.2261]

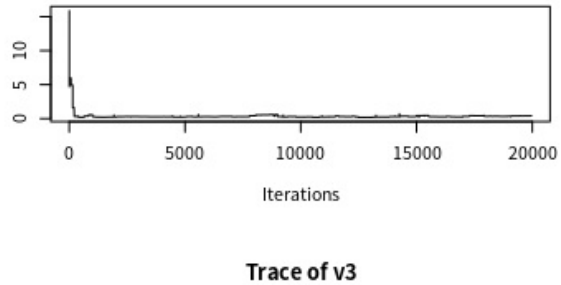
众数[0.3373 0.2679 0.2078]

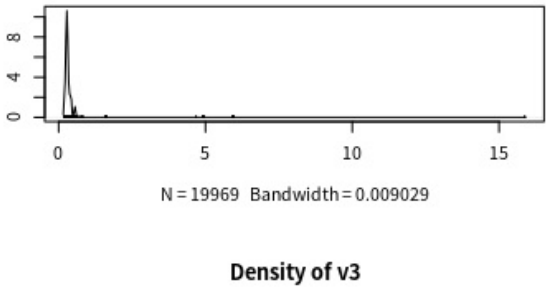
中位数=[0.4229 0.2905 0.2062]

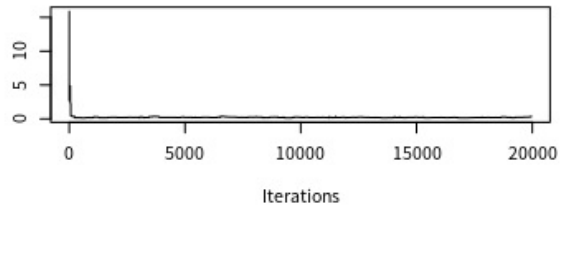
中位数和均值差不多，中位数优于均值

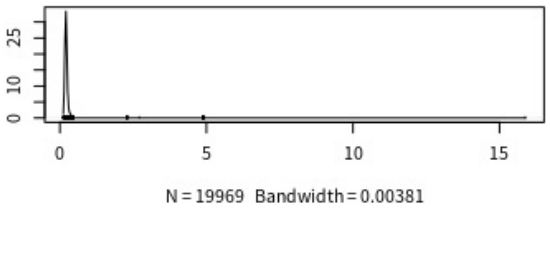












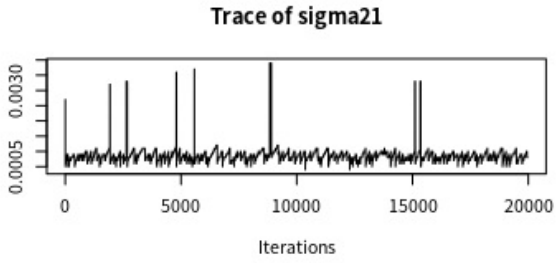
sigma2=[0.001 0.0025 0.0005]

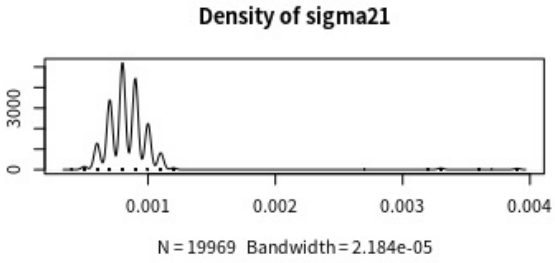
计算结果的均值[0.001 0.0025 0.0005]

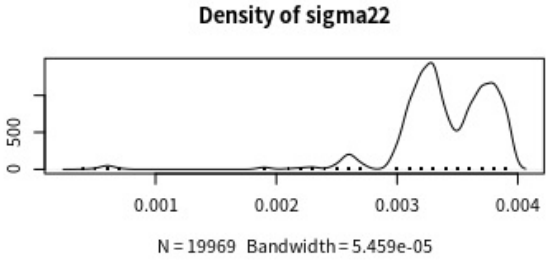
众数=[0.0008 0.0033 0.001]

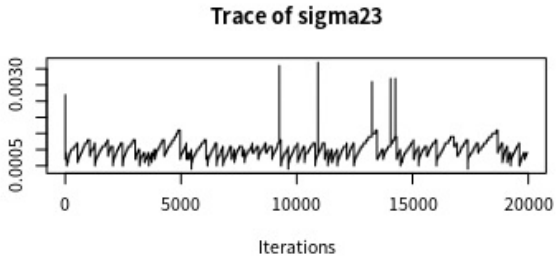
中位数=[0.0008 0.0034 0.001]

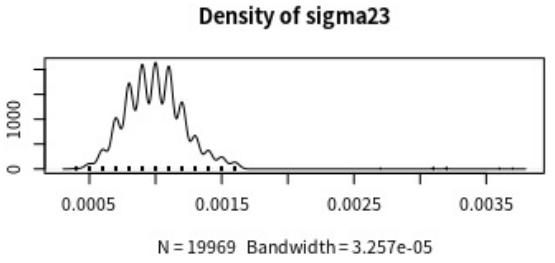
中位数和众数差不多，都比均值更接近峰值











综上，选择中位数代表收敛的结果。

- 收敛性分析

pi1=1/3

mean	se_mean	sd	25%	50%	75%	n_eff	Rhat
0.33	0	0.1	0.26	0.33	0.4	11062	1

pi2=1/3

mean	se_mean	sd	25%	50%	75%	n_eff	Rhat
0.33	0	0.1	0.26	0.33	0.4	11247	1

pi3=1/3

mean	se_mean	sd	25%	50%	75%	n_eff	Rhat
0.33	0	0.1	0.26	0.33	0.4	10481	1

w1=0.5

mean	se_mean	sd	25%	50%	75%	n_eff	Rhat
6.04	0.73	1.54	5.49	5.57	5.77	4	1.47

w2=1.0

mean	se_mean	sd	25%	50%	75%	n_eff	Rhat
0.52	0.01	0.04	0.5	0.52	0.55	20	1.06

w3=10

mean	se_mean	sd	25%	50%	75%	n_eff	Rhat
7.84	0.34	1.31	6.96	7.67	8.28	15	1

v1=1.0

mean	se_mean	sd	25%	50%	75%	n_eff	Rhat
0.47	0.03	0.23	0.36	0.42	0.52	52	1.06

v2=0.2

mean	se_mean	sd	25%	50%	75%	n_eff	Rhat
0.32	0.01	0.06	0.29	0.31	0.37	15	1.13

v3=0.2

mean	se_mean	sd	25%	50%	75%	n_eff	Rhat
0.22	0.01	0.04	0.19	0.22	0.24	45	1.01

s1=0.001

	mean	se_mean	sd	25%	50%	75%	n_eff	Rhat
0.0009	0	0	0	0	0	0	344	1

s2=0.0025

	mean	se_mean	sd	25%	50%	75%	n_eff	Rhat
0.0034	0	0	0	0	0	0	53	1

s3=0.0005

	mean	se_mean	sd	25%	50%	75%	n_eff	Rhat
0.0010	0	0	0	0	0	0	111	1

pi全部收敛：Rhat均为1，且n_eff非常大
w1,w2还未收敛：w1,w2的Rhat均大于1，而且三个w的有效数目都非常小
v2未收敛，v1和v3已收敛：v2的Rhat大于1，还未收敛，而v1和v3的Rhat均为1，说明已经收敛；v2的n_eff较小
sigma2未收敛，sigma1和sigma3已收敛：sigma2的Rhat大于1，而且n_eff较小，sigma1和sigma3的Rhat接近1，且n_eff较大。

- 由于v2,w1,w2,sigma2的Rhat显示还未收敛，继续迭代过程。