# MCAR simulation-folder3

*7/27/2017*

Method summary: update $\beta$ conditioned on $b_i$, impute the initial value of missing $X_{it}$ from its own available observations with replacement and update missing $X_{it}$ using M-H algorithm.

**Part 1: running time**

```
##run n_iter=10000 iterations
time
```

```
##     user   system  elapsed
## 1398.714  139.139 1543.667
```

**Part 2: evaluate the method of imputing initial value of missing $X_{it}$**

```
maxdiff.ini.X  ##maximum difference
```

```
## [1] 41.09636
```

```
mindiff.ini.X  ##minimum difference
```

```
## [1] -37.79174
```

**Part 3: MCMC results**

```
burnin=5000
(posterior.mean.eta=apply(eta_keep[-(1:burnin),],2, mean))
```

```
## [1]  0.000000  2.281062  1.007299 -0.525364
```

```
(posterior.mean.M=apply(M_keep[-(1:burnin),],2, mean))
```

```
## [1]  0.0000000  0.6172524  1.2028198 -0.5984983
```

```
(posterior.mean.v=apply(v_keep[-(1:burnin),],2, mean))
```

```
## [1]  0.4806974 -0.3053725
```

```
(posterior.mean.beta=apply(beta_keep[-(1:burnin),],2, mean))
```

```
## [1] -0.1732966  0.3896362
```

```
(posterior.mean.sgmr2=mean(sgmr2_keep[-(1:burnin)]))
```

```
## [1] 7.289774
```

```
(posterior.mean.sgm2=mean(sgm2_keep[-(1:burnin)]))
```

```
## [1] 3.873753
```

```
(posterior.mean.E=mean(E_keep[-(1:burnin)]))
```

```
## [1] 1.721941
```

```
##mean of imputed X
MI.mean.X=apply(X_keep[-(1:burnin),], 2, mean)
##difference with the true X
(diff=MI.mean.X-(SVXYR$X)[R_sim==0])
```

```
##   [1]   1.494348837  -1.634283761   0.187606367   0.255908210  -0.491600612
##   [6]   0.360567982   0.322326997   1.502194493  -1.552799970   0.814473069
```

```
##  [11]   1.147751470   1.673007313  -0.311875078  -1.115249038   1.175754117
##  [16]  -1.571065319   0.204605337   1.244782375  -0.942819381  -0.135177603
##  [21]  -0.023845050  -1.307786047  -1.683618785  -1.442423288   1.330967172
##  [26]   0.456565984  -0.427997116   0.087633892  -1.897271681  -1.481330941
##  [31]   2.536611999  -1.130037117   1.584152733   0.645817242   1.474742232
##  [36]  -0.471590117   0.816669771  -0.969840263   0.011625183   1.044696563
##  [41]   0.948842098  -1.350521981  -2.108024068   0.789999178   0.065144206
##  [46]  -1.766068533  -0.266069984   0.220893213  -1.658060043   0.208079263
##  [51]  -0.999088027   0.480145612  -1.813408161  -1.003124974  -0.211554641
##  [56]  -2.052408970   0.530783708  -1.306791577   0.864684895  -1.439026458
##  [61]  -3.590905539   0.141961092   0.835789196   0.107975279  -0.462131487
##  [66]   0.872846292  -1.032290981  -0.293729243   0.172006889   0.344440592
##  [71]   1.391037983   1.259589932   0.947899929  -0.058862828   0.222767554
##  [76]   1.474371851  -0.722269950   0.050758725  -0.049678558   1.015166462
##  [81]   0.125531157  -1.677281470   0.394500248   2.524955900  -1.144650297
##  [86]  -0.749383658  -2.292723479  -0.724627863  -0.142398581  -0.099859536
##  [91]  -1.476206856   0.583531258   1.244283186  -0.036084753  -0.972673286
##  [96]  -0.755881341  -1.041225916   1.155488517  -1.400637409  -0.054407971
## [101]   0.149094438  -0.800906149  -1.875545255   1.916436691   0.366916299
## [106]   0.952022744   0.523169005  -1.062325506   0.007658342   0.646129796
## [111]   0.714200382   0.352023839   0.738999084  -0.406085065   1.112279300
## [116]  -0.187785506  -0.527734083  -0.412182297   0.631847703  -1.112272593
## [121]  -0.302619671  -0.248067342   0.186200780   1.184008690  -0.721426056
## [126]  -0.468666866   0.170926956   1.104584963  -0.195375087   1.183208243
## [131]  -1.714482912   0.089749736  -0.648046108   0.308450394  -1.422882248
## [136]  -2.011940258   0.480807594  -0.019152121  -0.541275135  -0.290109799
## [141]  -1.799746473  -0.774303524  -0.466749764   1.625324910  -0.665170871
## [146]  -0.280032556   0.180702309  -1.258757943  -0.797045526  -0.820405148
## [151]  -1.606297819  -0.659855974   0.820674676   0.047379228  -1.321704819
## [156]  -1.078854720   1.901930671   0.758958822  -0.307526115   0.801108080
## [161]   0.113329877   0.237470380   0.689536541  -0.642619411   0.215005591
## [166]   1.254492076   1.056018087   1.381578371   0.870273593   1.071987030
## [171]   6.845973154   6.455335158   2.669652933   2.202244594   2.182856365
## [176]  -2.285208328  -5.021438654  -2.818014326  -5.278713361  -8.966777892
## [181]   1.541398564   0.716764127   4.192921150   4.873292567   0.686981669
## [186]   1.376303905  -0.067999113  -0.161174661   0.542336887   0.512765017
## [191]  -0.856968713  -0.970741300   0.106448727   1.778609004   1.967178615
## [196]   1.572181194   1.100490554   0.332755283  -1.145702753   2.172468610
## [201]   0.521261260   1.255422402  -0.991015290  -0.770089779   0.819873596
## [206]  -0.254130113   2.042168658   1.919430146  15.925657400  15.119968658
## [211]  -0.756322856  -0.324946407 -18.752995739   0.301968636  -0.538524554
## [216]  -0.003606144  -0.849259524   1.479036295  -1.386903944  -0.824622221
## [221]   0.636555853  -0.488339216  -2.162518727  -1.975299136  -0.276719147
## [226]  -0.665222963  -0.327747477  -0.587689844   1.264958128   0.693173971
## [231]   1.296107132   0.588090747  -1.109046631   2.292136134   1.105404932
## [236]  -2.075921531   0.541734907  -0.194925584   0.721698886   1.538428063
## [241]  -0.647242829   0.748822311   0.795723810   1.467602485   1.566016933
## [246]   0.111744250   0.171990750  -0.447246187   1.150817171   0.680285166
## [251]   1.185742777   0.508036746   1.046401942   0.786547954   1.043254899
## [256]  -0.500717560   0.684352530   0.266762388  -0.088802540   1.031203917
## [261]  -0.168623245   1.974139240   1.046074581   1.464446048   0.889099165
## [266]   0.444217210   1.947494000   1.389685745   0.702191825   1.369579451
## [271]  -1.571643476   0.601672598   0.267511380   0.070345691   0.452286021
## [276]  -1.503707976  -0.258915017   1.444623789  -0.758874048  -1.817632220
```

```
## [281]   0.980410886  -2.009293527  -0.009657624  -0.859885225  -1.096474512
## [286]  -0.866715907  -0.125609522   0.311677476  -0.952124983  -0.742215408
## [291]   1.071785730  -0.235961697  -1.664763533  -0.081517786  -0.213367663
## [296]  -0.101952037   0.345877716   0.271311411  -0.946321814   0.605873862
## [301]  -0.415332051  -0.118631845   0.029864348   0.511446147   0.797093659
## [306]  -2.397673313  -0.692781233   0.577000415  -0.763193493  -0.340874331
## [311]   0.649901989   0.092657722  -1.504545493  -1.974836942   1.331297820
## [316]  -1.264608094  -0.361868413   0.549788262  -0.168468516  -1.203653574
## [321]  -0.492562230   0.392010002  -0.932288241   0.517058853   2.319336480
## [326]   0.292206216   0.336837882   1.961409126   2.091959518   1.879606088
## [331]  -0.247336918   1.152159132   0.181840545  -1.391796176  -0.371815886
## [336]   0.252027708   1.840736052   1.047559343   0.478513075   1.094745571
## [341]   1.398554442   0.135810701  -1.041025025   0.590329688  -1.241434073
## [346]   1.198115046   1.732240753  -1.396808076  -2.431390382   1.214292503
## [351]   0.134946008  -1.773193088   0.640875223   1.616290767  -1.382385375
## [356]  -0.819304739  -0.163043084   1.425137411  -0.012184804  -1.303326854
## [361]   0.288453185   1.762203698   0.121081249  -0.665503506  -0.871505726
## [366]   0.278500913   0.450893933  -0.974332483   2.479927947  -0.711601515
## [371]  -0.393247014  -0.607110031  -0.034103576  -0.641645897  -1.005792683
## [376]  -1.302275907   1.739116197  -1.692265608   0.161803582   1.396370648
## [381]   0.915211625   1.695724639   1.054221500   0.903597837  -2.202884497
## [386]  -0.898898542  -0.498843108   0.956921765  -0.641442478   1.166058952
## [391]   2.202899532  -0.455792216   0.873360331  -0.315199280   0.610835130
## [396]   0.723019925  -0.201637665   0.575881714   0.839975258   0.709523984
## [401]   0.964392829   1.267354038   0.983464915   0.123590789  -1.062985697
## [406]   2.165152931   0.840891741  -0.978806054  -0.103471980   1.264038016
## [411]  -0.093328199   2.023403467   1.517630900  -0.800084145  -0.762618319
## [416]   0.019192983   0.329190320  -1.116656169   1.008464973  -1.770777141
## [421]   0.549889603   0.058085708   0.294622788   0.699860084  -0.026058952
## [426]   1.498939852  -0.887592599   0.300300723   0.749797623   1.745685447
## [431]  -2.623221184   0.973168401  -0.066757417  -1.538272415  -1.614141245
## [436]   0.494086179   1.407456857  -0.566442709  -0.319195559  -0.123723032
## [441]  -0.861212684   1.249011687   0.193215936   0.038822909   0.723040924
## [446]   1.038923938   1.474852035   1.164163187  -0.640394439   2.030017452
## [451]  -1.621379184  -1.181787669   1.624290808  -0.402031350   0.431412643
## [456]   0.859519156   1.043579639   2.595541019  -0.386820440   1.875036286
## [461]   0.828666760  -0.179783799  -0.194511549  -0.650864087
```

```
min(diff)
```

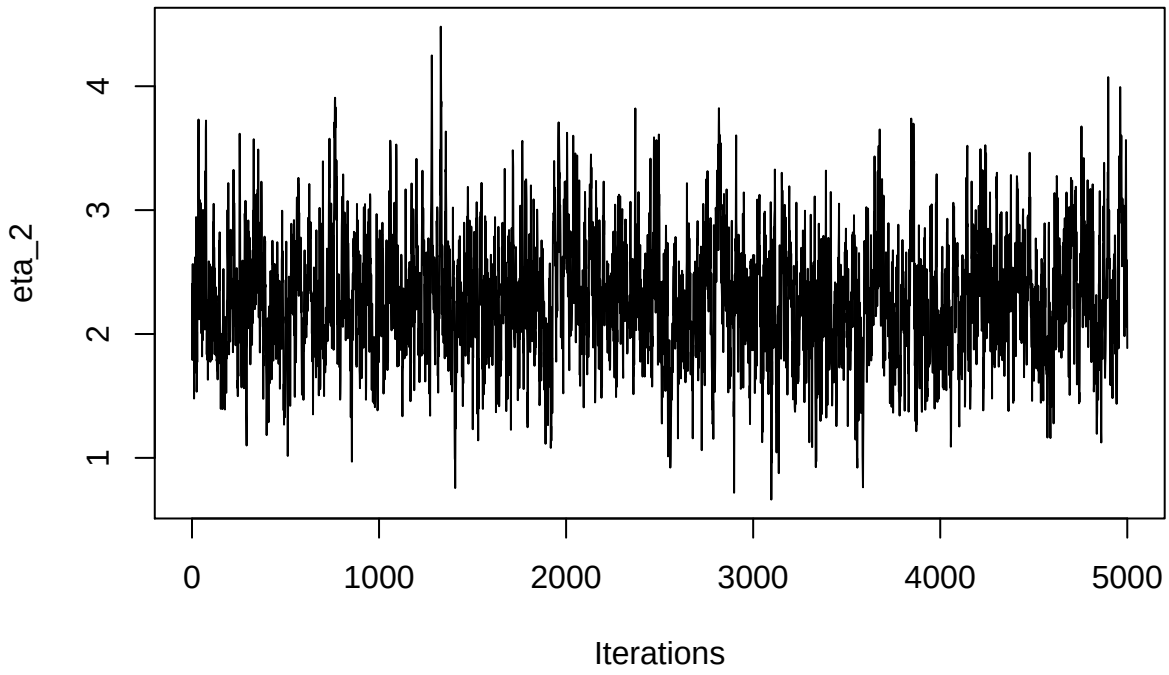
```
## [1] -18.753
```

```
max(diff)
```

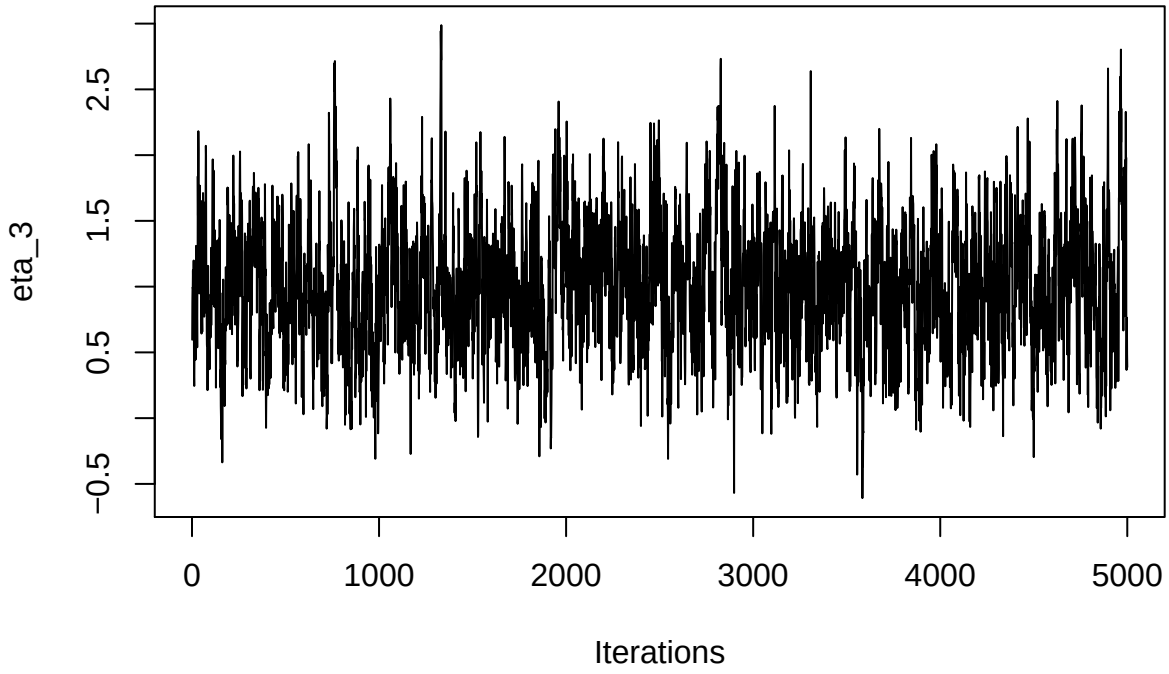
```
## [1] 15.92566
```

**Part 4: traceplots**

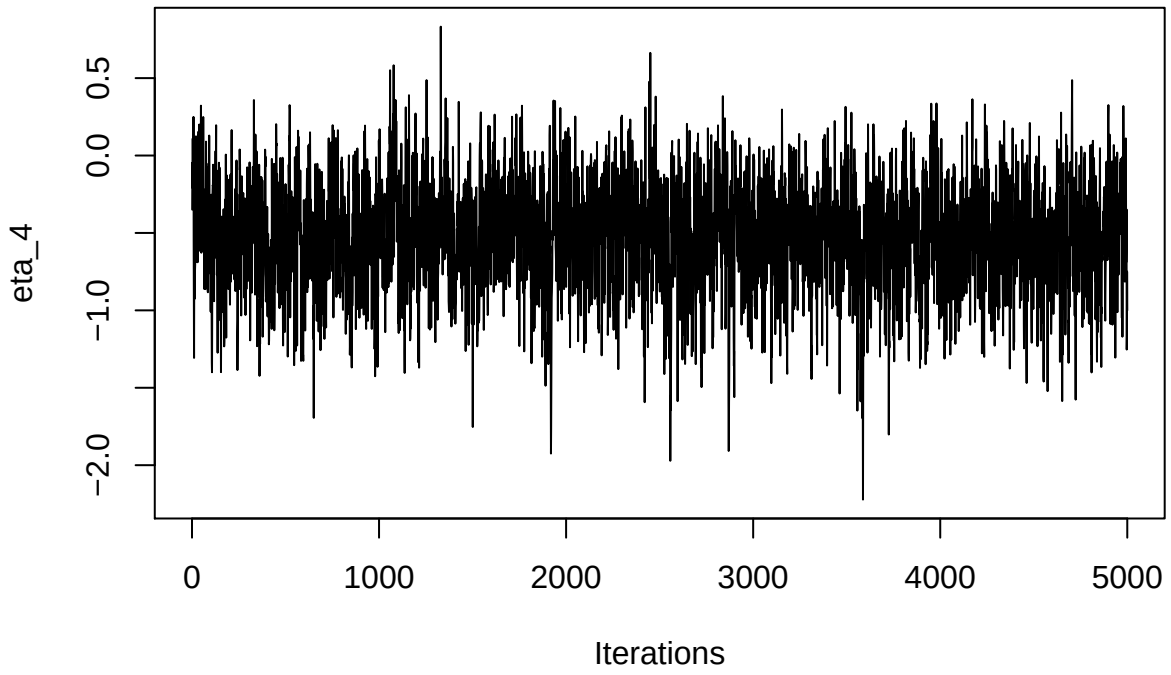
```
##traceplots after burn-in
##ture value of eta2 is 0.5
traceplot(x=as.mcmc(eta_keep[-(1:burnin),2]), ylab="eta_2")
```



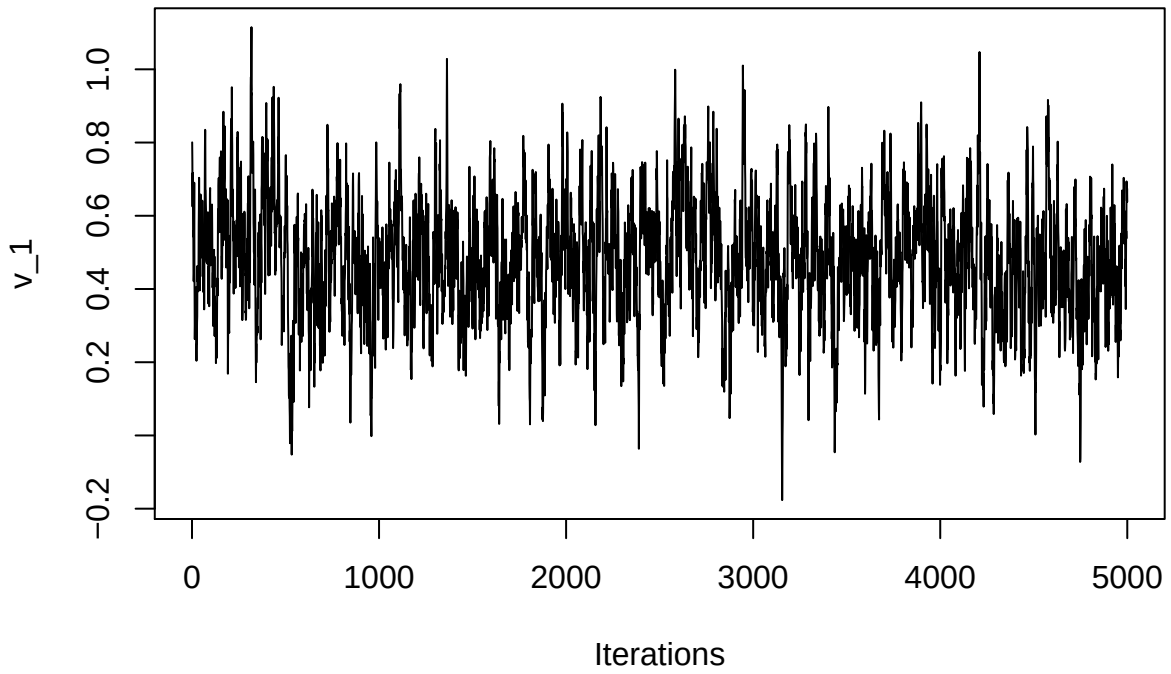

```
##true value of eta3 is 1.5
traceplot(x=as.mcmc(eta_keep[-(1:burnin),3]), ylab="eta_3")
```



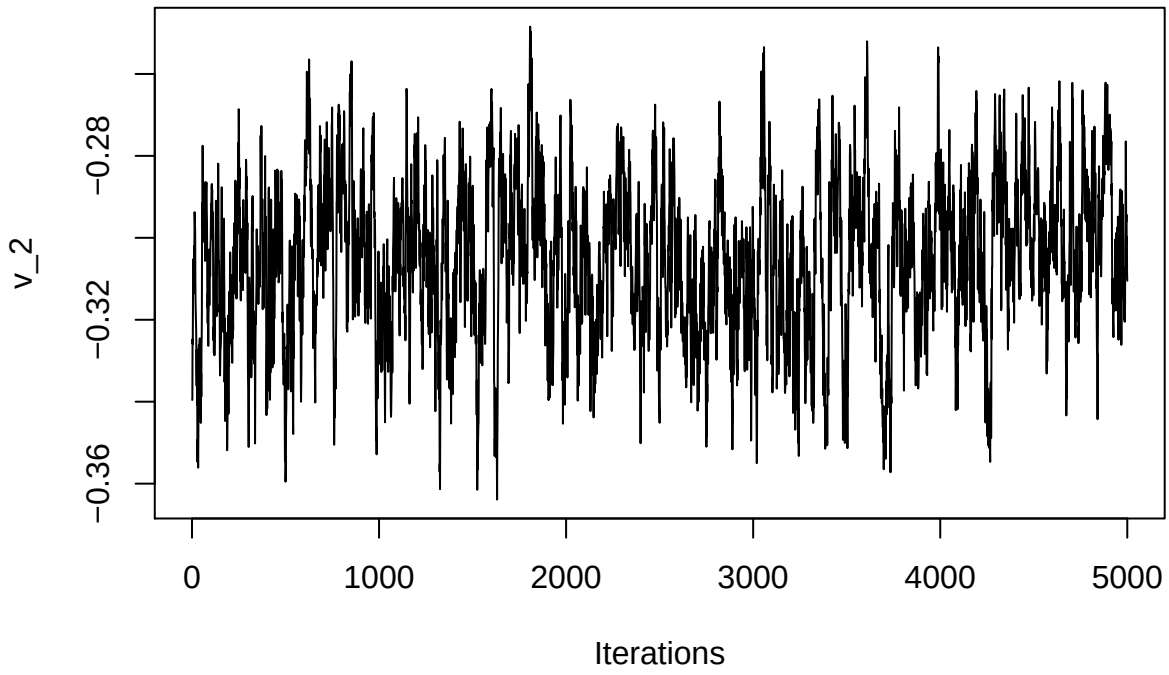

```
##true value of eta4 is 1
traceplot(x=as.mcmc(eta_keep[-(1:burnin),4]), ylab="eta_4")
```



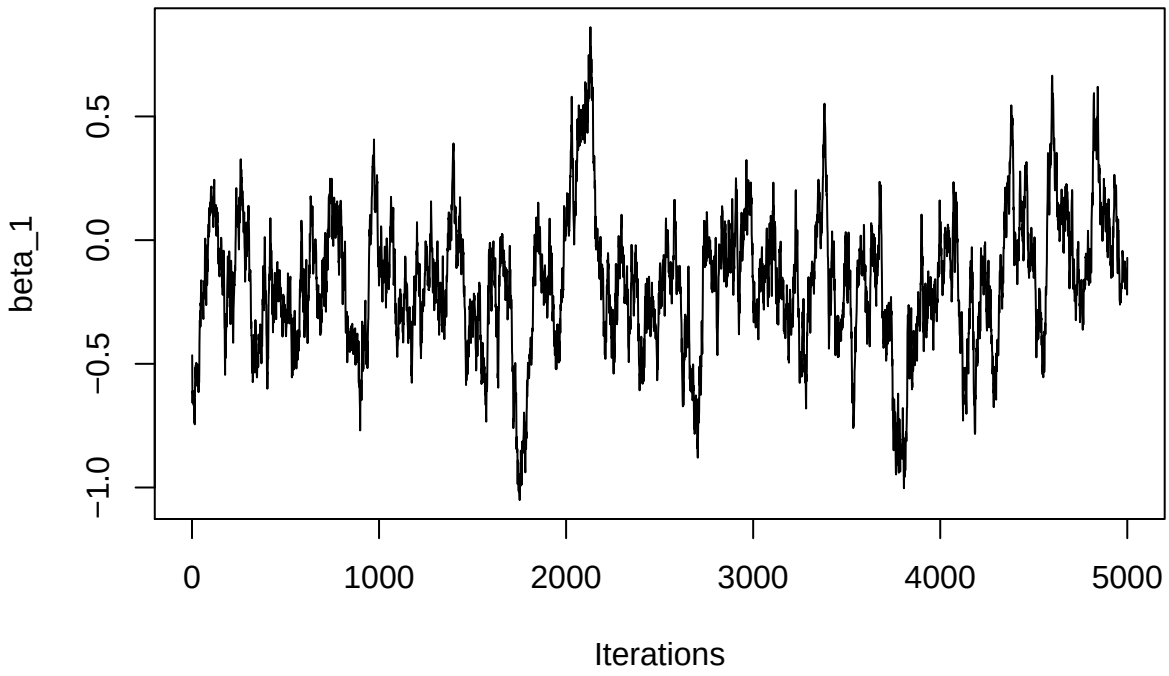

```
##true value of v1 is 0.5
traceplot(x=as.mcmc(v_keep[-(1:burnin),1]), ylab="v_1")
```



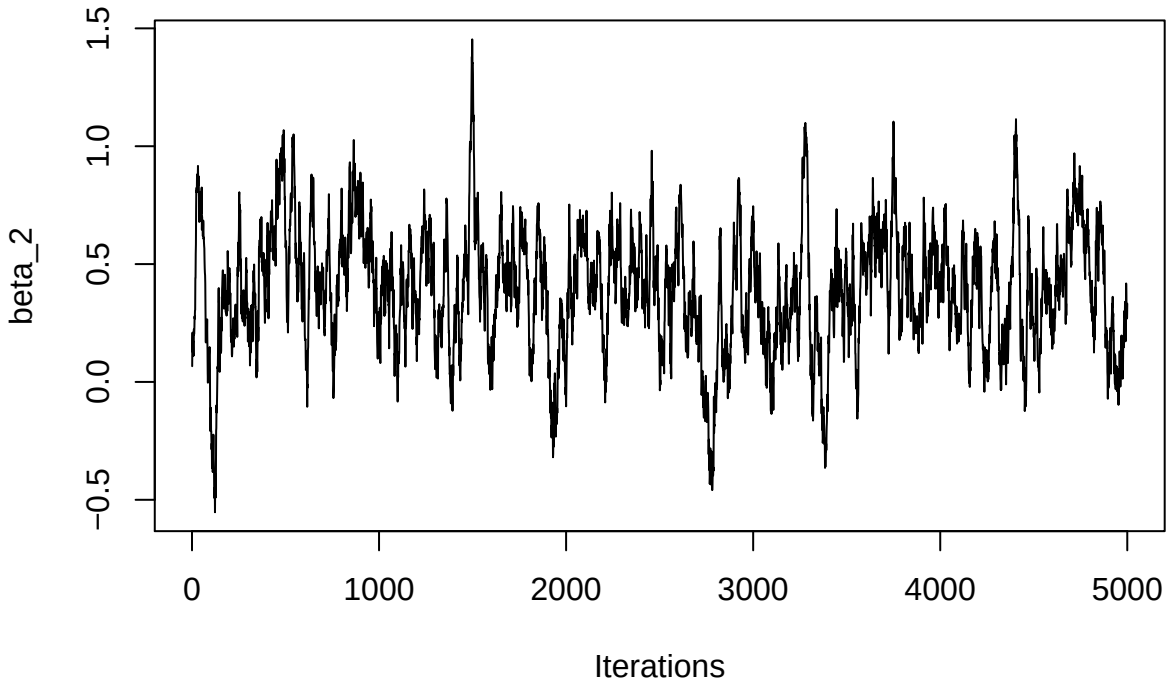

```
##true value of v2 is -0.3
traceplot(x=as.mcmc(v_keep[-(1:burnin),2]), ylab="v_2")
```



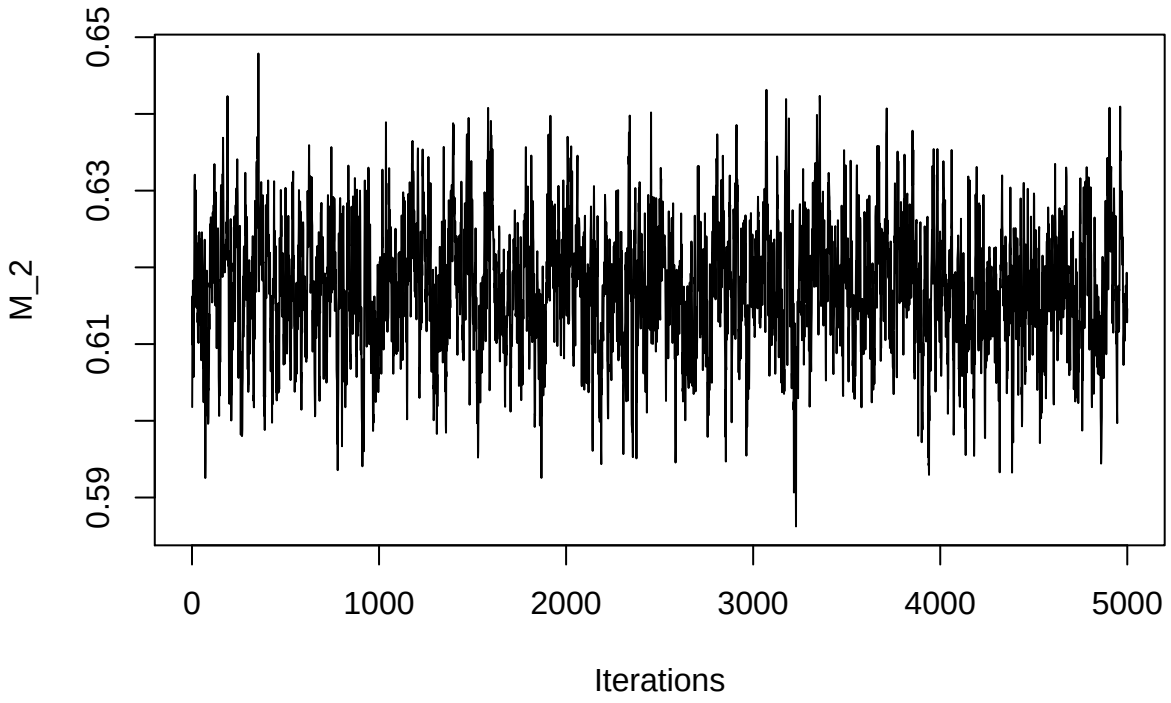

```
##true value of beta1 is -0.4
traceplot(x=as.mcmc(beta_keep[-(1:burnin),1]), ylab="beta_1")
```



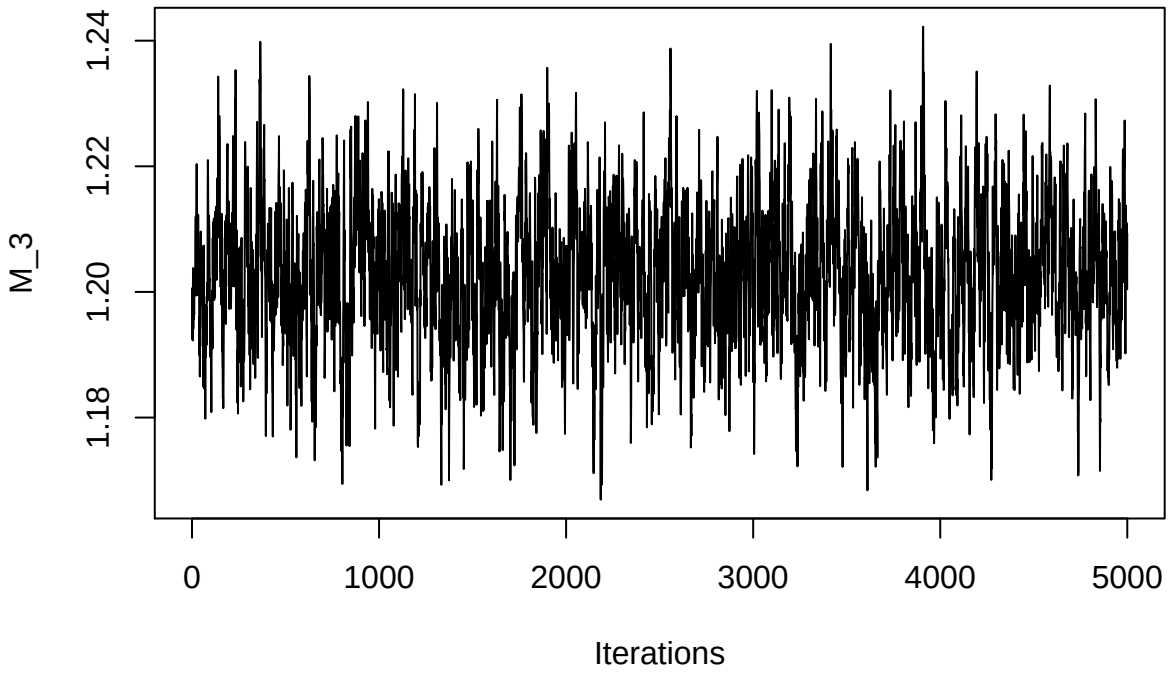

```
##true value of beta2 is 0.5
traceplot(x=as.mcmc(beta_keep[-(1:burnin),2]), ylab="beta_2")
```



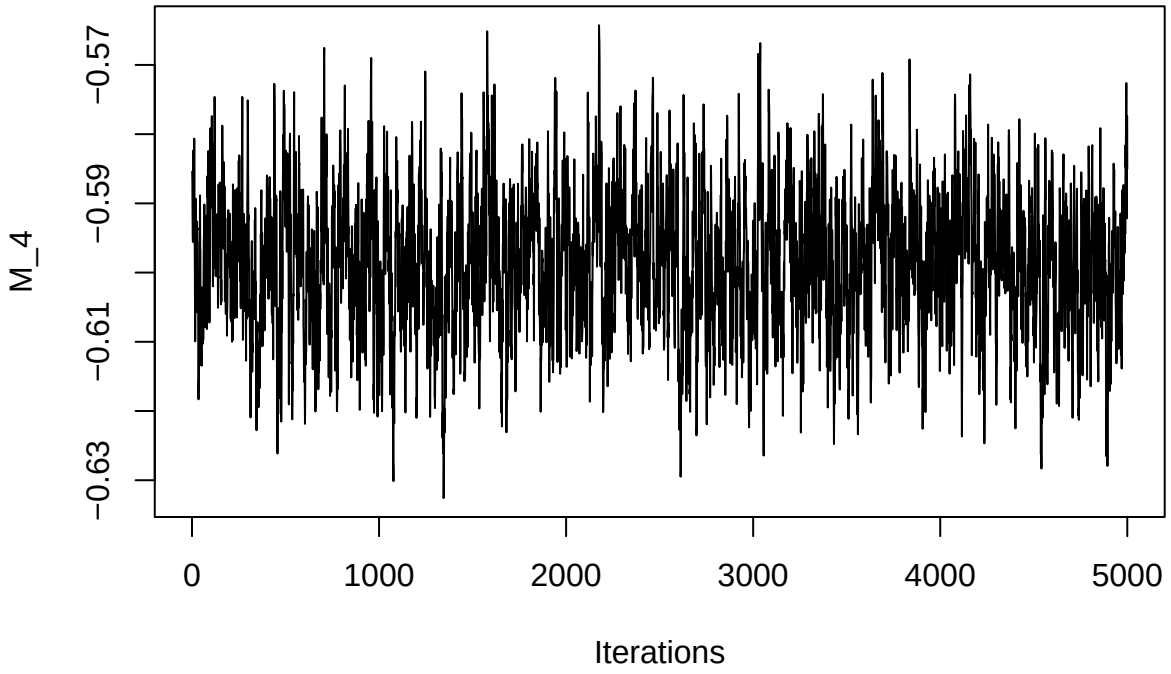

```
##true value of M2 is -0.6
traceplot(x=as.mcmc(M_keep[-(1:burnin),2]), ylab="M_2")
```



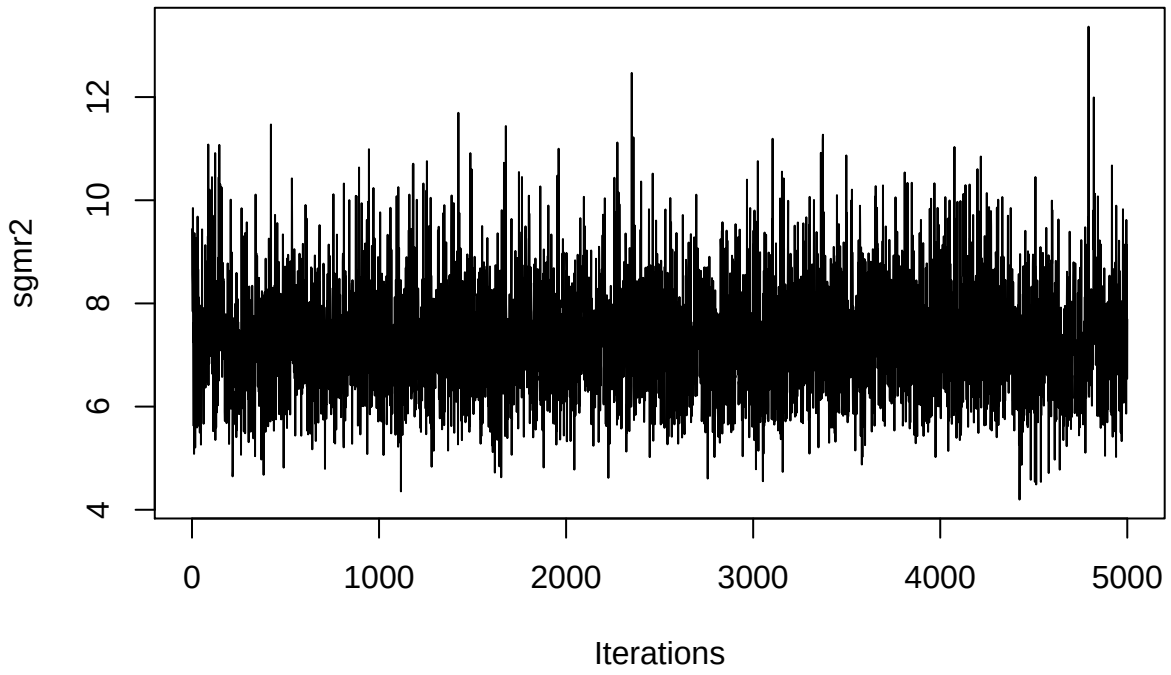

```
##true value of M3 is 0.6
traceplot(x=as.mcmc(M_keep[-(1:burnin),3]), ylab="M_3")
```



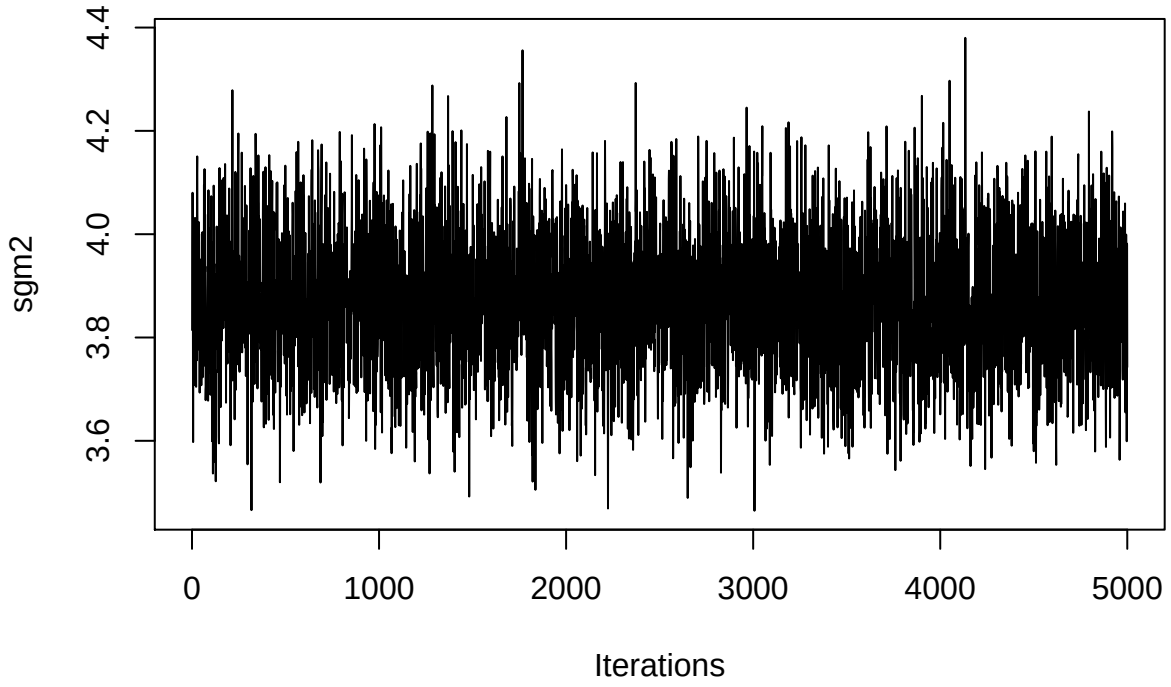

```
##true value of M4 is 1.2
traceplot(x=as.mcmc(M_keep[-(1:burnin),4]), ylab="M_4")
```



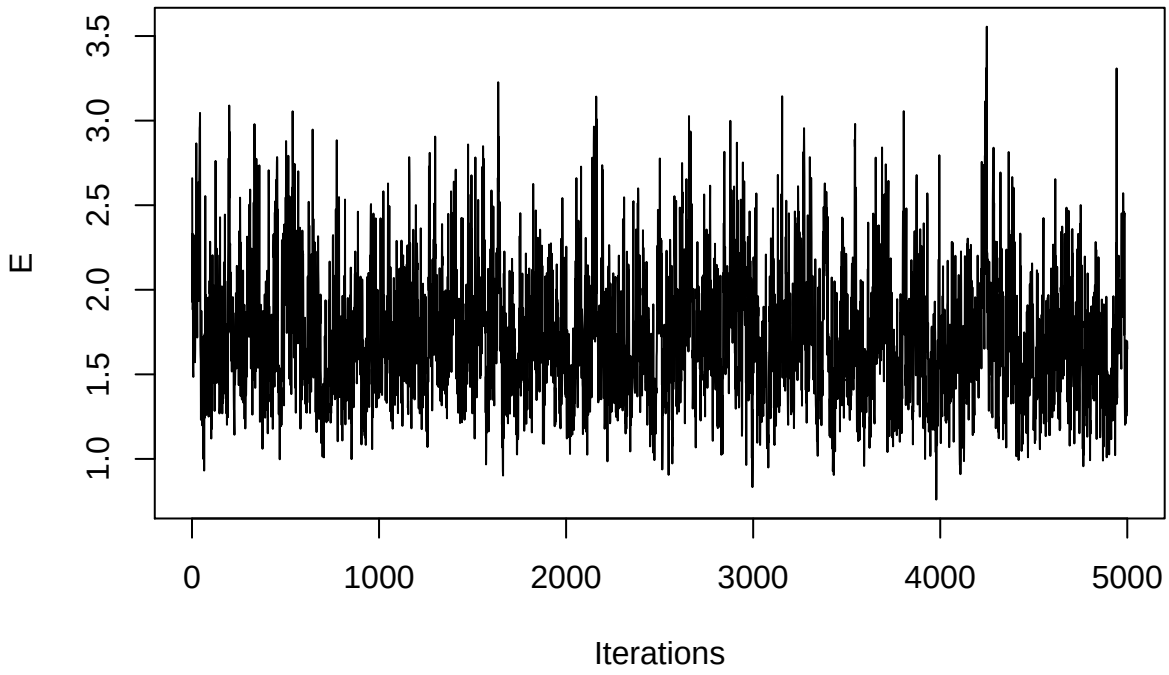

```
##true value of sgmr2 is 1
traceplot(x=as.mcmc(sgmr2_keep[-(1:burnin)]), ylab="sgmr2")
```




```
##true value of sgm2 is 1
traceplot(x=as.mcmc(sgm2_keep[-(1:burnin)]), ylab="sgm2")
```




```
##true value of E is 1
traceplot(x=as.mcmc(E_keep[-(1:burnin)]), ylab="E")
```


E
1.0
1.5
2.0
2.5
3.0
3.5
0
1000
2000
3000
4000
5000
Iterations