

# MCAR simulation-folder4

7/27/2017

Method summary: update  $\beta$  conditioned on  $b_i$ , impute the initial value of missing  $X_{it}$  using linear interpolation and update missing  $X_{it}$  using M-H algorithm.

## Part 1: running time

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

```
##      user      system elapsed
## 1446.996   127.437  1584.805
```

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

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

```
## [1] 3.912702
```

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

```
## [1] -4.002502
```

## Part 3: MCMC results

```
burnin=5000
```

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

```
## [1] 0.0000000 2.1948336 1.0745012 -0.5518294
```

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

```
## [1] 0.0000000 0.5976989 1.2015274 -0.5953317
```

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

```
## [1] 0.5165777 -0.3090480
```

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

```
## [1] -0.4690786 0.4758381
```

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

```
## [1] 1.889177
```

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

```
## [1] 1.380627
```

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

```
## [1] 1.726629
```

```
##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] 1.969704296 -1.763830981 -0.147649449 0.352945806 -0.480589862
```

```
## [6] 0.370498258 0.325924160 1.553848045 -1.489255095 0.965218022
```

```

## [11] 1.506253703 1.432426568 -0.399783813 -1.155024098 1.223932603
## [16] -1.574060254 0.174198292 1.208028830 -0.970216396 0.340971641
## [21] -0.265857707 -0.756869583 -1.091222298 -1.495450182 1.219319493
## [26] 0.406822929 -0.525659269 -0.064868595 -1.897847292 -1.813207457
## [31] 2.314879930 -1.323290537 1.513477328 0.608815532 1.439793851
## [36] -0.504950619 0.750991979 -1.398536784 0.349451391 1.259588144
## [41] 0.546669263 -1.121245482 -2.311884883 0.708054393 0.023269466
## [46] -1.805572193 -0.266974223 0.222295293 -1.708411780 -0.051607223
## [51] -1.041515690 0.485561267 -1.834194471 -1.018799672 -0.023537396
## [56] -1.816680635 0.088563319 -1.116874908 1.155887310 -1.180560660
## [61] -3.391631697 0.142034538 0.815132127 0.079196494 -0.532839512
## [66] 0.770090849 -1.229927443 -0.504435307 -0.172372786 0.544959883
## [71] 0.939741747 0.831792694 0.564917095 0.049667209 0.291069255
## [76] 1.488195013 -0.650774414 0.077894743 0.057265475 1.065485789
## [81] 0.577702912 -1.316522631 0.505830550 2.256957782 -1.474117865
## [86] -0.269998636 -1.953160622 -0.665309764 0.063344338 -0.023653242
## [91] -1.482708436 0.602712459 1.214254521 -0.093571997 -0.792158374
## [96] -0.665612981 -1.028903649 1.182965450 -1.394258322 0.016926999
## [101] 0.114624122 -0.844437726 -1.513180791 1.666219556 0.109499607
## [106] 0.695512157 0.271010740 -1.327092063 -0.326908967 0.277726087
## [111] 0.269509174 -0.076366969 0.282075286 -0.243781483 0.517052663
## [116] -0.132607826 -0.505465213 -0.332697766 0.781238481 -0.991761336
## [121] -0.130040490 -0.168389773 -0.360716749 1.300819180 -0.594894893
## [126] -1.152319906 -0.118216463 0.864526181 -0.237497350 1.128800344
## [131] -1.008258800 0.080678453 -0.714687529 0.112365776 -1.600859781
## [136] -2.325954595 0.355773358 -0.070458719 -0.519934987 -0.220779794
## [141] -1.847021791 -0.824003867 -0.525215216 1.615847219 -0.344054553
## [146] 0.036185536 -0.212474559 -1.660224289 -0.498685816 -1.115138723
## [151] -1.249600307 -0.318692829 0.542313371 0.455446428 -0.670246396
## [156] -0.980682400 1.917151217 0.809984726 -0.319717512 0.806069901
## [161] -0.106570040 -0.090961010 0.442395674 -0.903516419 -0.097637697
## [166] 0.976876677 0.821098685 1.121719740 0.667410733 0.639193145
## [171] -1.165214237 -1.132636752 -1.472120183 -1.293087444 -0.807081850
## [176] -1.111548947 -2.120135179 0.668813960 0.510794208 -1.965958782
## [181] 0.983185466 0.419280492 5.138853029 4.955437354 0.721232642
## [186] 1.215200140 -0.205805703 -0.268145933 0.332427203 0.341440520
## [191] -0.699364805 -0.799406202 0.494352257 1.385433078 1.381276970
## [196] 1.750005056 1.048330811 0.274206815 -1.210202472 2.122824961
## [201] 0.612986814 1.237716419 -0.958606470 -1.177055683 0.423786476
## [206] -0.653241782 1.656782518 1.509567276 -0.815173237 -0.487796761
## [211] -0.779182856 0.842867264 0.452177796 0.425881038 -0.376079131
## [216] 0.174334666 -1.378696493 1.110567444 -1.070124534 -0.538630899
## [221] 0.859137269 -0.341616491 -2.108374885 -1.881790825 -0.116374060
## [226] -0.571360188 -0.315481059 -0.547105745 1.279988155 0.741719019
## [231] 1.346633125 0.684229285 -0.862067825 2.570304128 0.769886896
## [236] -2.098929076 0.593516163 -0.230871663 0.638175606 1.620096799
## [241] -0.581626903 0.829651284 0.809886019 1.544327644 1.235110869
## [246] -0.285059918 -0.200450331 -0.255774205 0.824627874 0.542293461
## [251] 1.054138058 1.089971250 0.900975768 0.516234261 0.723902748
## [256] -0.378748972 0.835006805 0.395938887 0.010959810 1.184311176
## [261] -0.073257681 2.061453162 0.850471099 1.275110742 0.669540142
## [266] 0.117676036 1.658186348 1.084800822 0.666619830 1.303825512
## [271] -1.695672964 0.285568982 -0.058875413 0.307393174 0.707984513
## [276] -1.213728046 -0.041491220 1.051384883 -0.710587319 -1.134831385

```

```
## [281] 1.024012955 -2.044758768 0.014882866 -0.889338976 -0.766549728
## [286] -1.192199812 0.087410782 0.586573098 -1.311537497 -0.741262512
## [291] 1.122171089 -0.240401158 -1.618500832 -0.125217107 0.488522739
## [296] -0.126964231 0.022648934 -0.097389554 -0.675516574 0.230757176
## [301] -0.241092461 0.007226938 0.165206450 0.537034047 0.786384727
## [306] -1.915194891 -0.206528358 0.457587448 -0.820792930 -0.469947153
## [311] 0.451654652 -0.162433199 -1.124109383 -1.566719875 1.556917698
## [316] -1.059273063 -0.237343943 0.647732857 -0.121215410 -1.213468234
## [321] -0.676487202 0.232232134 -1.131278731 0.434077767 2.237594971
## [326] 0.192464252 0.210269945 1.939432279 1.893249572 1.695899242
## [331] -0.486324461 0.776128625 -0.194517213 -1.318542250 -0.268670881
## [336] 0.318174679 1.887751892 1.051248791 0.537522409 1.094493217
## [341] 1.399948442 0.181950230 -0.951878899 0.349235687 -1.573099147
## [346] 0.680017966 1.225023081 -1.342511074 -1.794691610 1.144719106
## [351] 0.258683714 -1.645519380 0.608351114 1.420088782 -1.476741510
## [356] -1.091192902 -0.483557775 1.502931434 0.019860028 -1.233488230
## [361] 0.290492736 1.466080629 -0.419013475 -0.521855100 -0.777051364
## [366] 0.376040989 0.493932779 -0.380528052 2.330665150 -0.175393298
## [371] -0.570688976 -0.919747142 -0.245726056 -0.727268473 -1.066501061
## [376] -1.399832899 1.729000214 -1.772851619 0.107794554 1.380898041
## [381] 0.853537816 1.464517263 0.986704502 0.852822360 -1.819583225
## [386] -0.408508463 -0.698480876 0.776711435 -0.141179649 1.025475363
## [391] 1.938655628 -0.724063023 0.578621923 0.009799535 0.664363878
## [396] 2.034690179 1.260741195 0.361266215 0.561748846 0.997215650
## [401] 0.846298212 1.119281745 0.840824427 0.007133897 -0.363841393
## [406] 2.191762945 0.711484612 -1.103216922 -0.244360278 1.078968847
## [411] -0.198866328 1.761385525 1.144435097 -0.502232179 -0.455503788
## [416] 0.178866512 0.350142341 -1.068749150 1.028613219 -1.705984817
## [421] 0.405664135 -0.139079659 0.155169883 0.140877148 0.073254220
## [426] 0.855906297 -0.869842942 0.282806497 0.738803207 1.727924643
## [431] -2.540496111 0.941944090 0.015964002 -1.441619801 -1.586788501
## [436] 0.484799749 1.440298261 -0.459057479 -0.290445568 -0.019774419
## [441] -0.900210669 1.140372904 0.047566719 -0.124983977 0.645242478
## [446] 0.714707259 1.429816548 1.006360896 -0.763071836 1.915694016
## [451] -1.862997844 -1.661526474 1.124979896 -0.355994468 0.342816997
## [456] 0.666163534 0.794401087 2.308483110 -0.082513303 1.544834133
## [461] 0.453834740 0.189480853 -0.559214708 -0.905682895
```

```
min(diff)
```

```
## [1] -3.391632
```

```
max(diff)
```

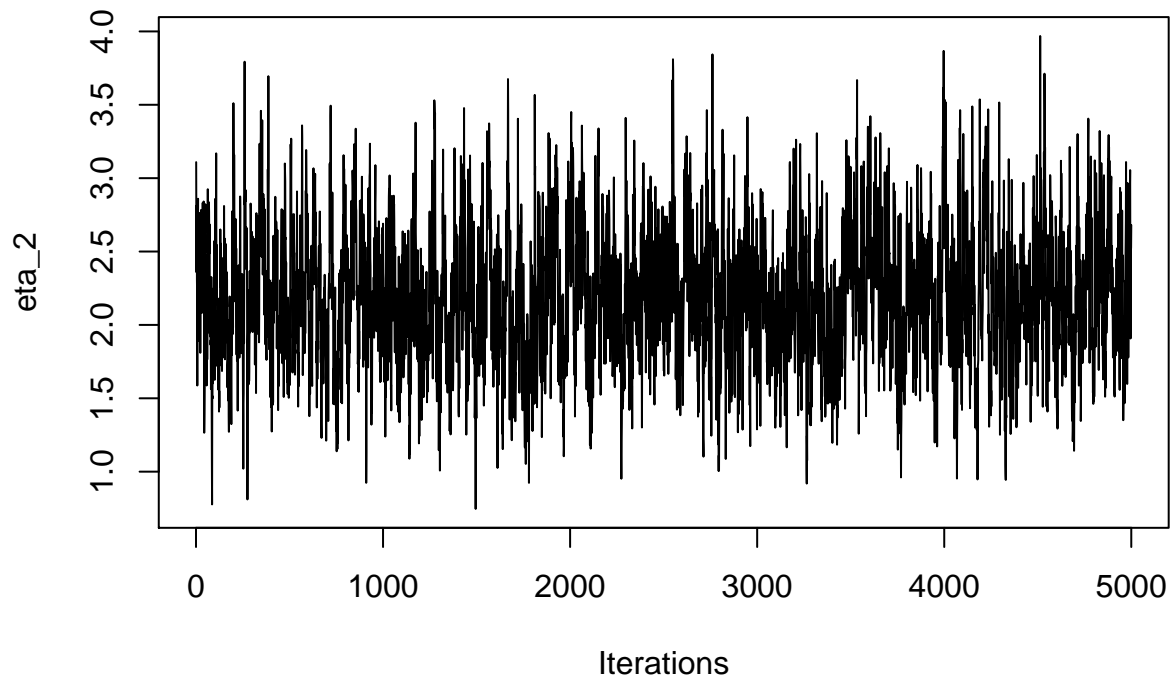
```
## [1] 5.138853
```

#### Part 4: traceplots

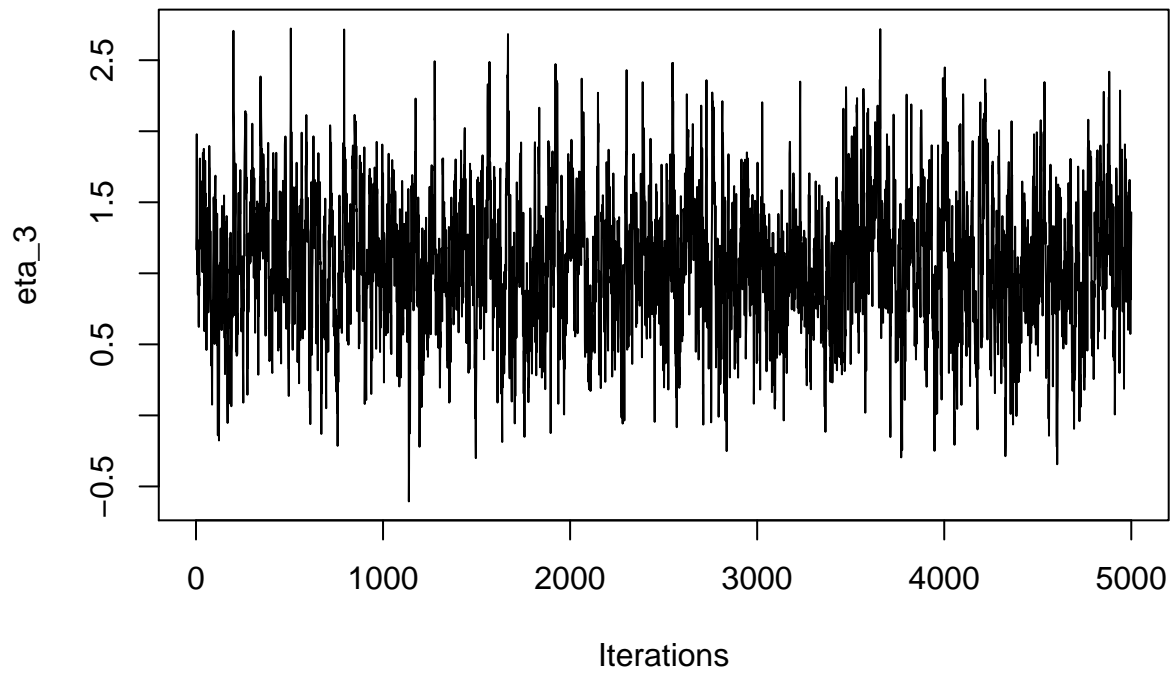
```
##traceplots after burn-in
```

```
##ture value of eta2 is 0.5
```

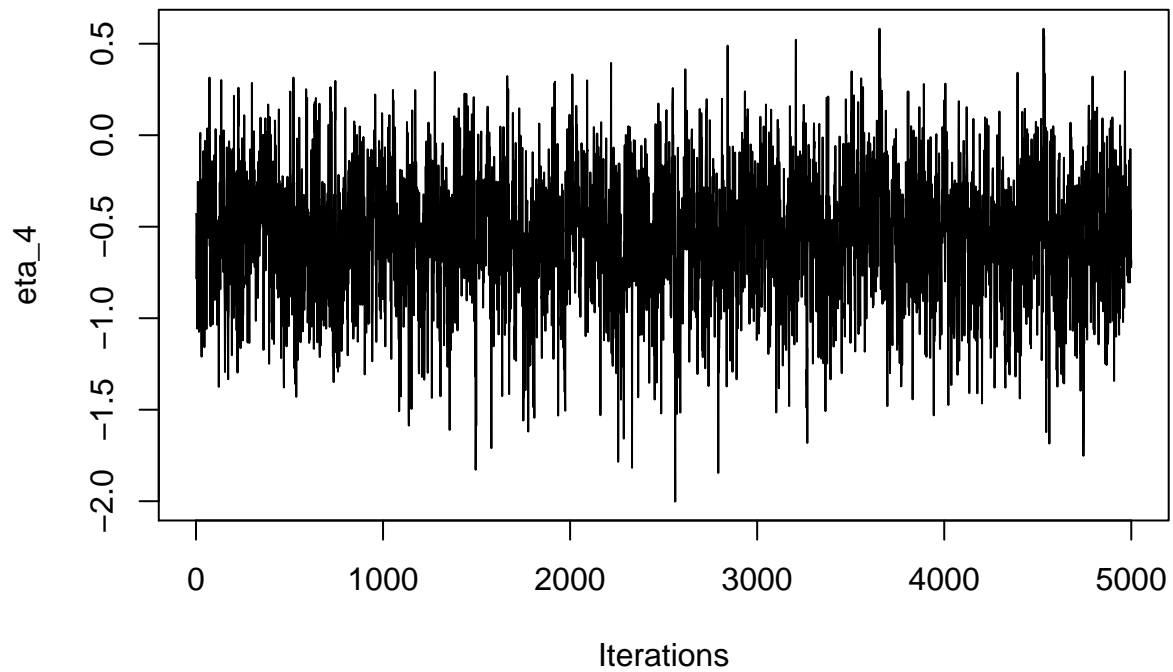
```
traceplot(x=as.mcmc(eta_keep[-(1:burnin),2]), ylab="eta_2")
```



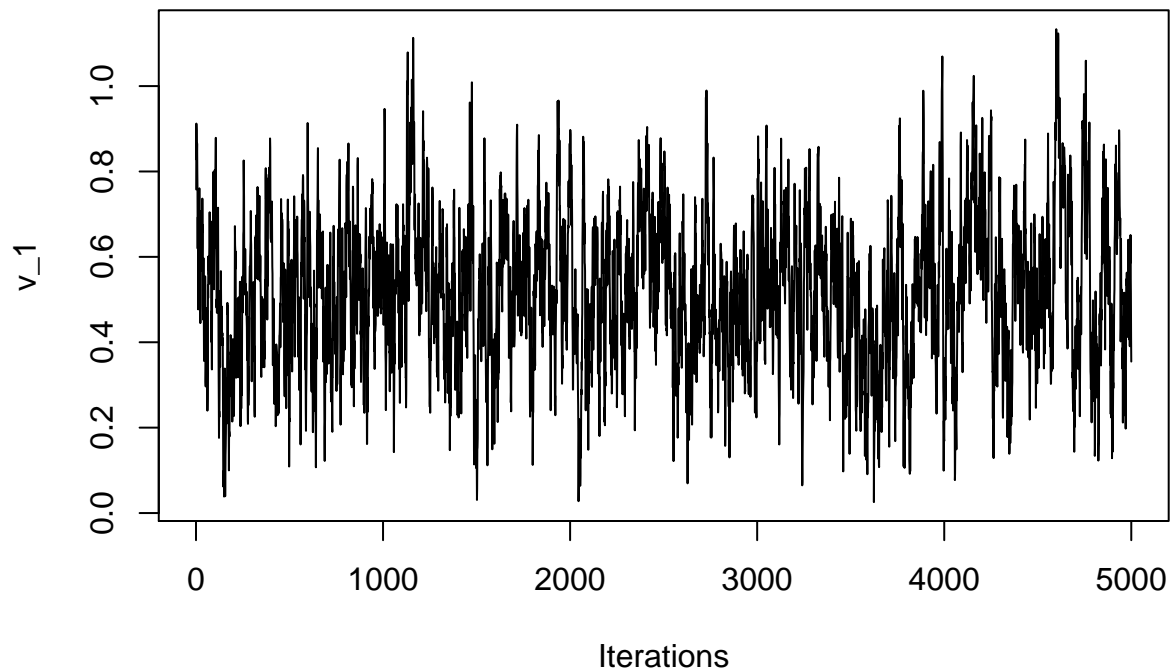
```
##true value of eta3 is 1.5  
traceplot(x=as.mcmc(eta_keep[-(1:burnin),3]), ylab="eta_3")
```



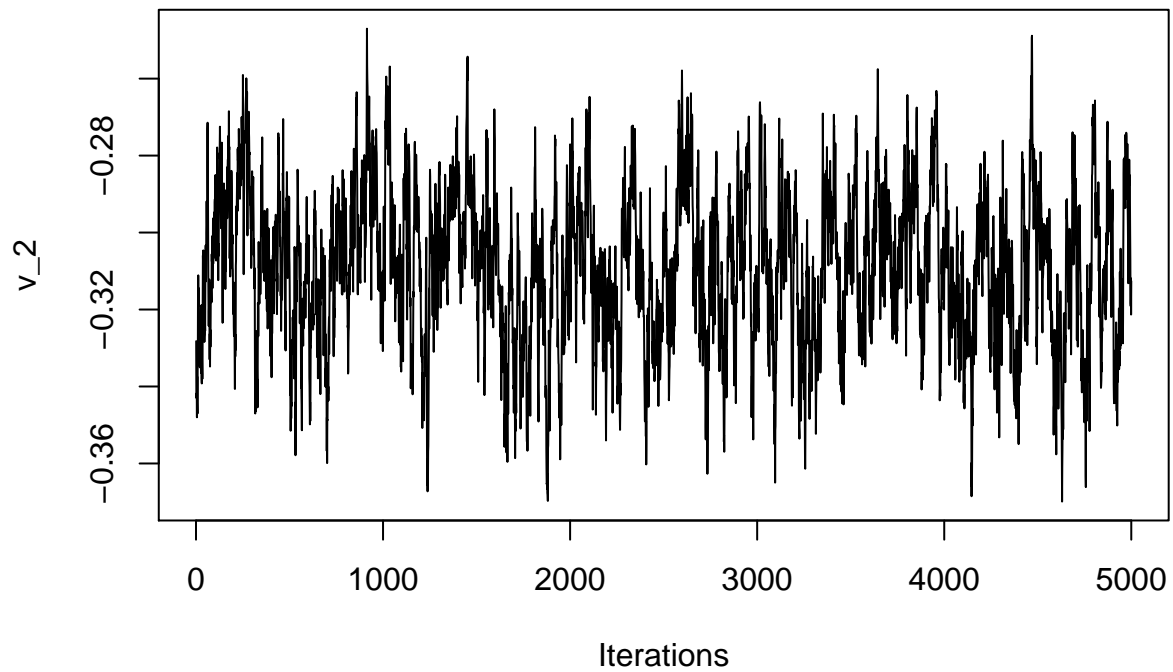
```
##true value of eta4 is 1  
traceplot(x=as.mcmc(eta_keep[-(1:burnin),4]), ylab="eta_4")
```



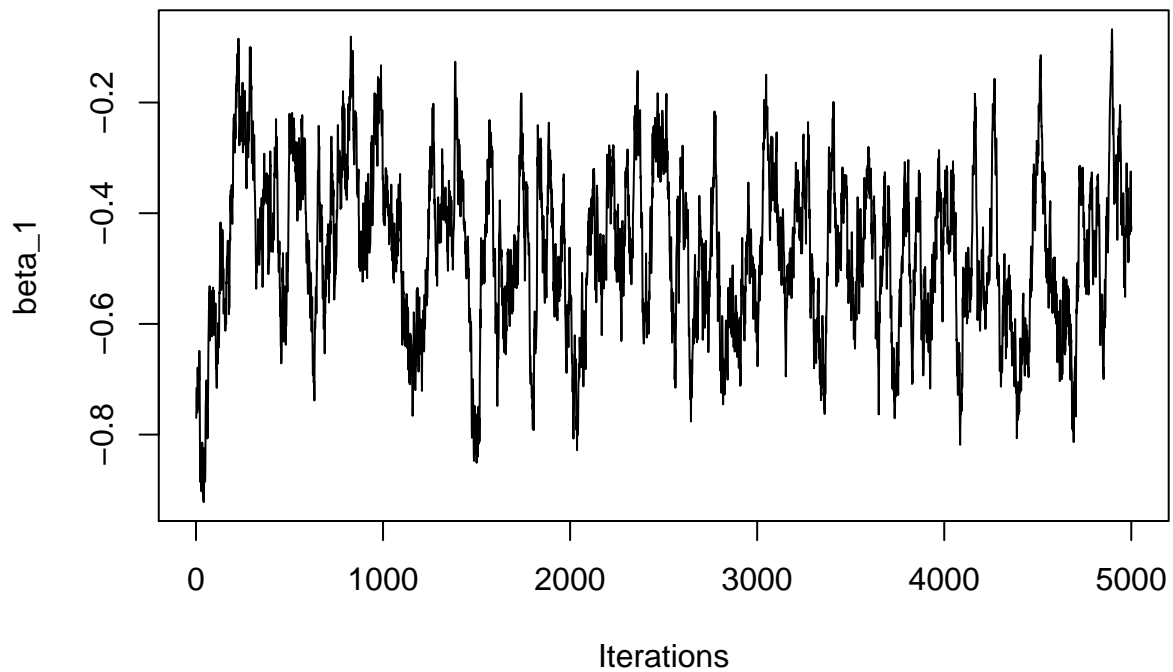
```
##true value of v1 is 0.5  
traceplot(x=as.mcmc(v_keep[-(1:burnin),1]), ylab="v_1")
```



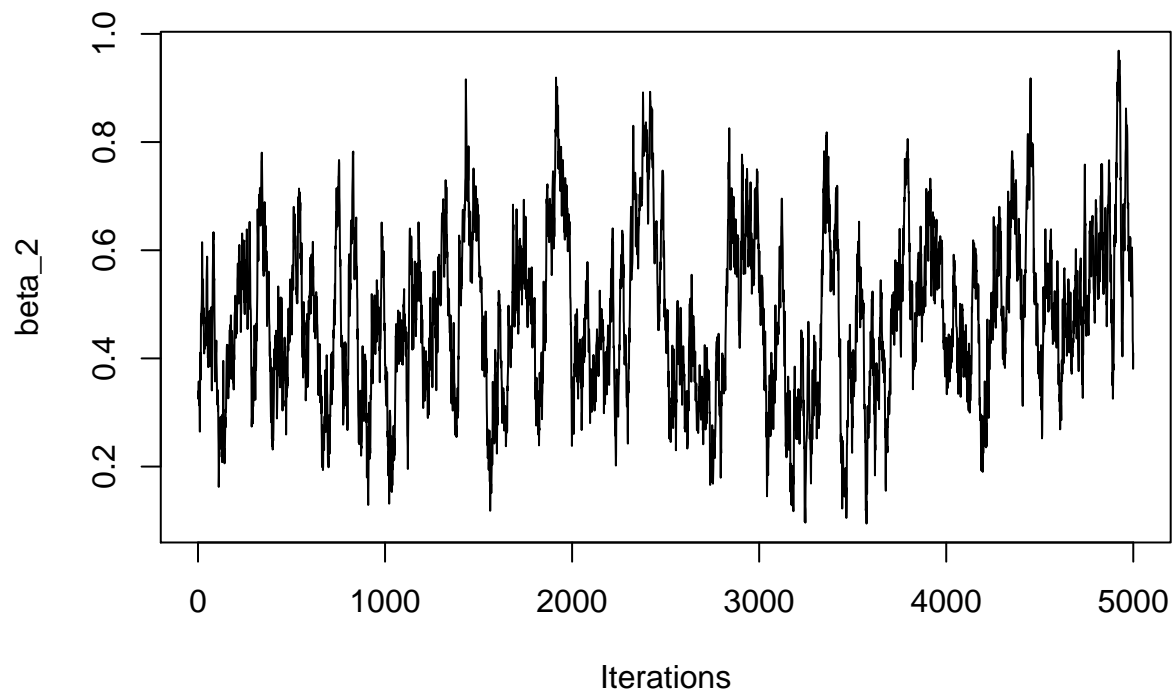
```
##true value of v2 is -0.3  
traceplot(x=as.mcmc(v_keep[-(1:burnin),2]), ylab="v_2")
```



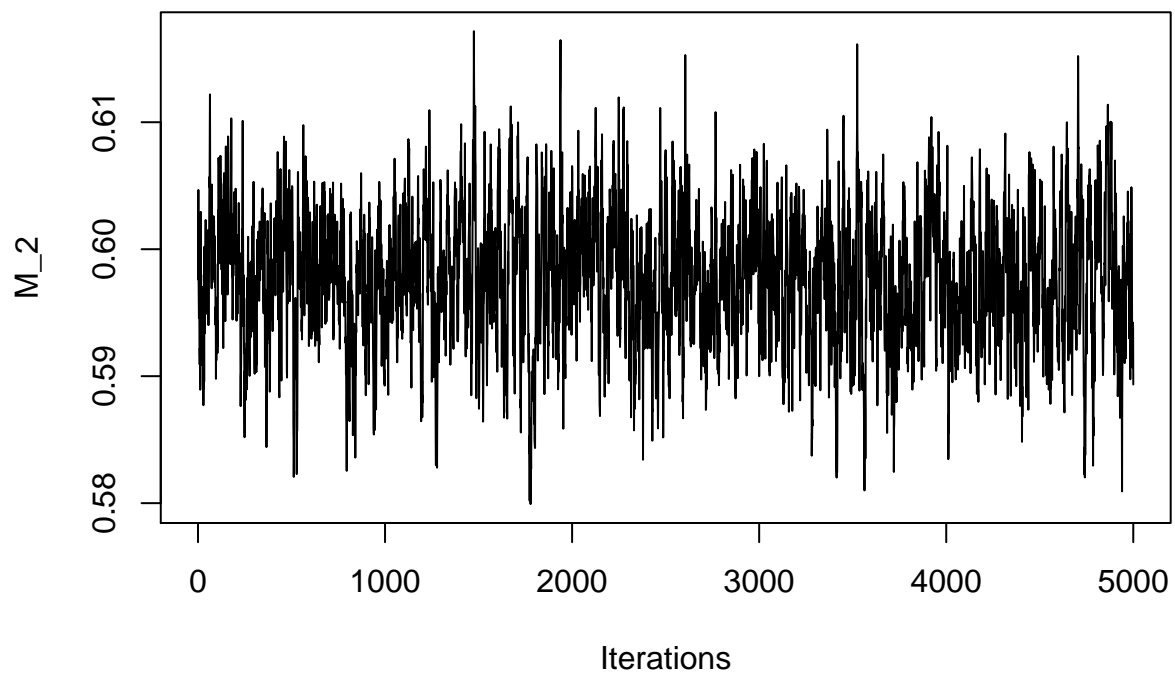
```
##true value of beta1 is -0.4  
traceplot(x=as.mcmc(beta_keep[-(1:burnin),1]), ylab="beta_1")
```



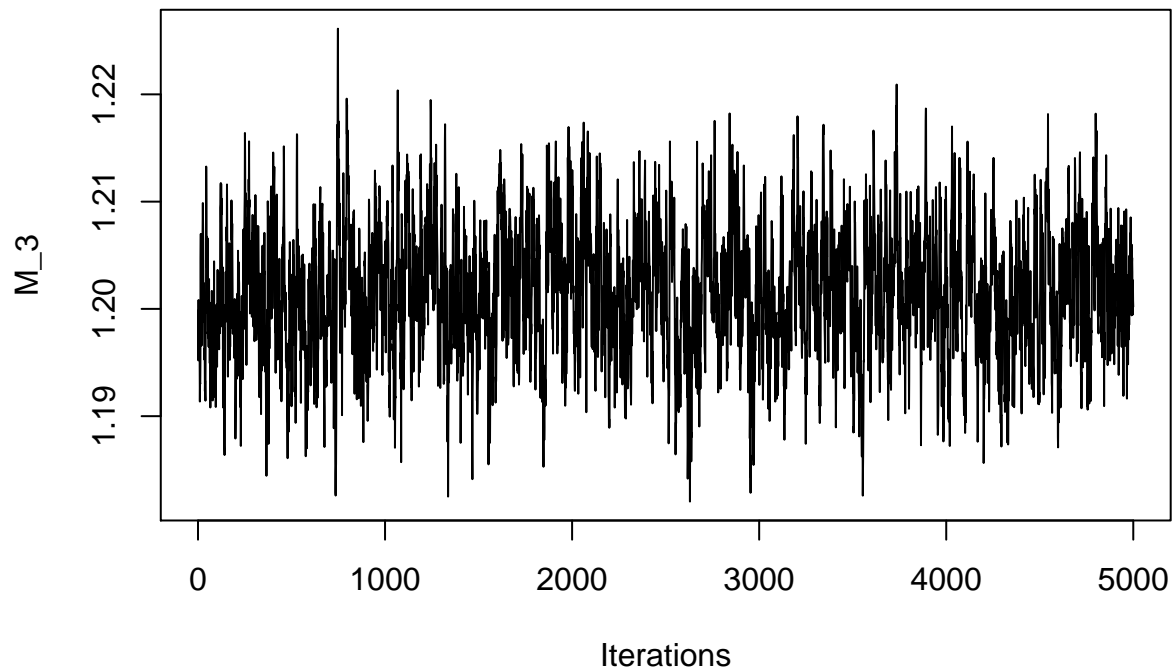
```
##true value of beta2 is 0.5  
traceplot(x=as.mcmc(beta_keep[-(1:burnin),2]), ylab="beta_2")
```



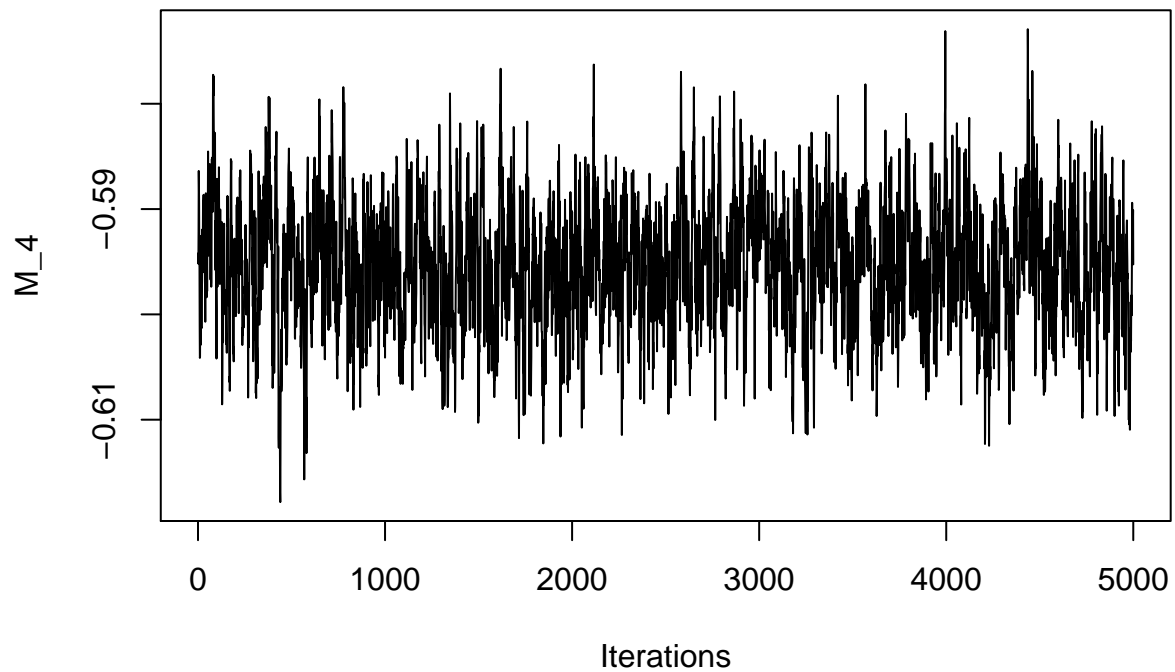
```
##true value of M2 is -0.6  
traceplot(x=as.mcmc(M_keep[-(1:burnin),2]), ylab="M_2")
```



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

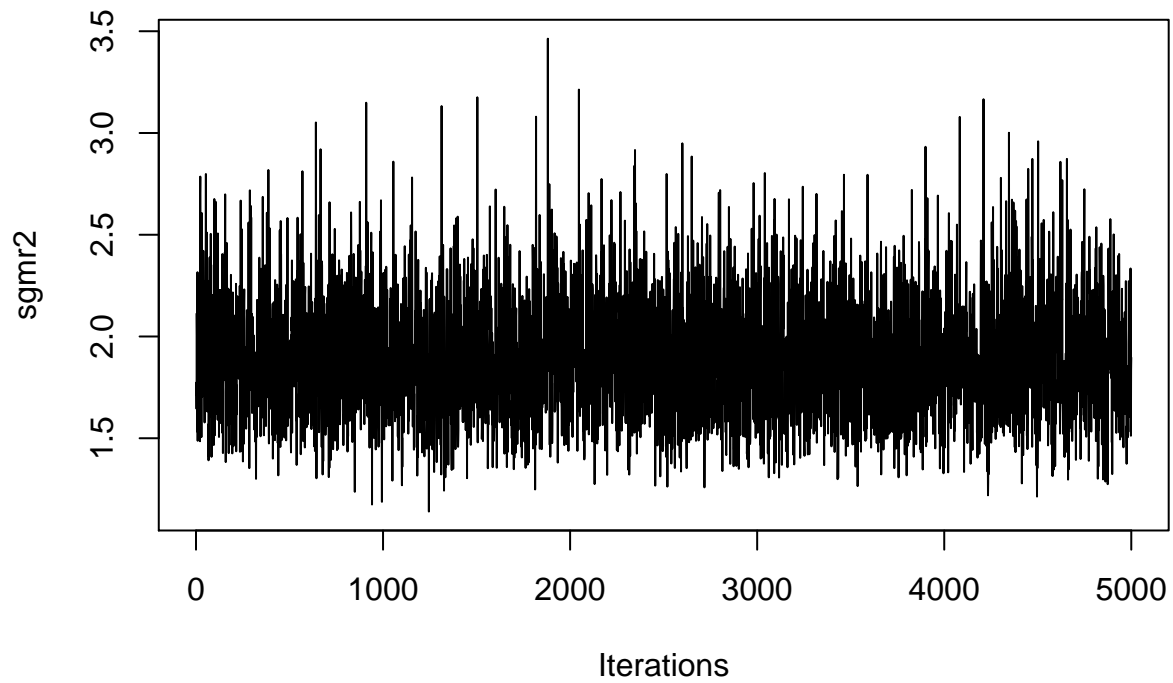


```
##true value of M4 is 1.2
traceplot(x=as.mcmc(M_keep[-(1:burnin),4]), ylab="M_4")
```

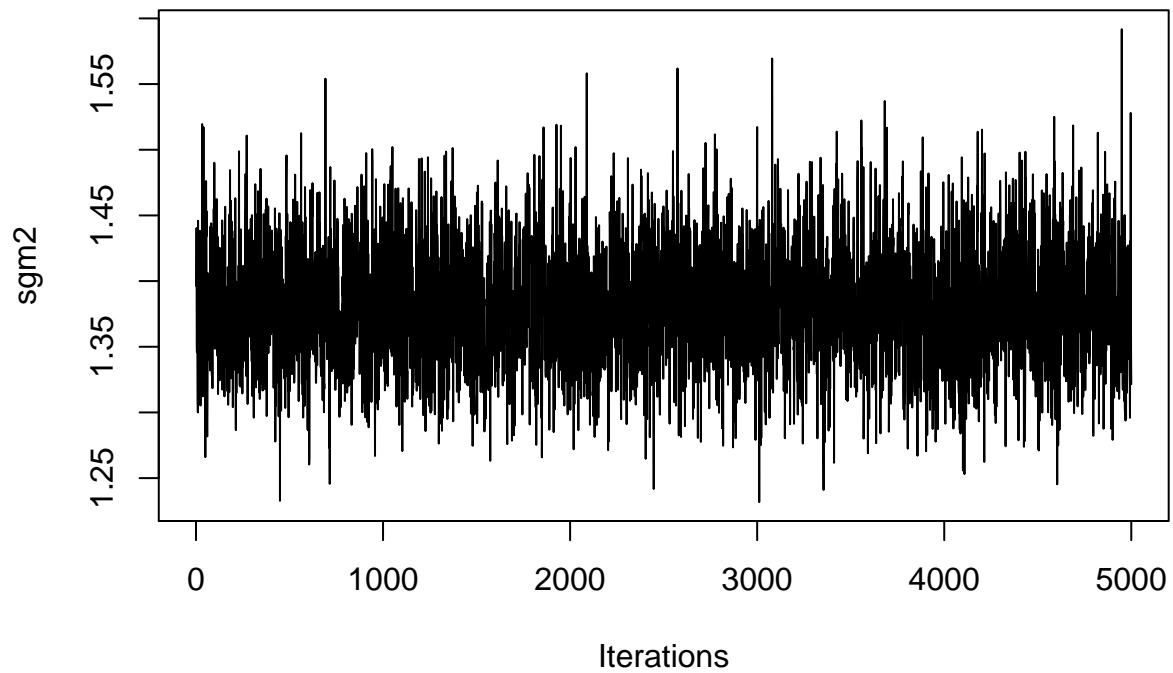


```
##true value of sgmr2 is 1
traceplot(x=as.mcmc(sgmr2_keep[-(1:burnin)]), ylab="sgmr2")
```





```
##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")
```

