106th HOUSE EXAMPLE (Continued)
RtoWINBUGS

STATA OUTPUT

```
. summ

    Variable |       Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
      bush00 |       432    46.81019    14.36873         6         80
      gore00 |       432    49.71296      14.005        20         93
     black00 |       432    12.68333    16.25699        .3         96
       south |       432    .3101852    .4631056         0          1
  hispanic00 |       432    12.31597    16.25281        .6         86
-------------+--------------------------------------------------------
      income |       432    30.75224    8.319547     15.06     57.219
     owner00 |       432    65.86875    11.92404         8       84.3
     dwnom1n |       432    .0586875    .4671698      -.815      1.269
     dwnom2n |       432   -.0381065    .4706545     -1.123       1.27
       ybush |       432    .4861111    .5003865         0          1
-------------+--------------------------------------------------------
       ygore |       432       .4375    .4966535         0          1

. probit ybush black00 south hispanic00 income owner00 dwnom1n dwnom2n

Iteration 0:   log likelihood = -299.27289
Iteration 1:   log likelihood = -154.89847
Iteration 2:   log likelihood = -134.46169
Iteration 3:   log likelihood = -130.43351
Iteration 4:   log likelihood = -130.12954
Iteration 5:   log likelihood = -130.12789
Iteration 6:   log likelihood = -130.12789

Probit estimates                                  Number of obs   =        432
                                                  LR chi2(7)      =     338.29
                                                  Prob > chi2     =     0.0000
Log likelihood = -130.12789                       Pseudo R2       =     0.5652

------------------------------------------------------------------------------
       ybush |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     black00 |  -.0285973   .0097913    -2.92   0.003    -.0477878   -.0094067
       south |   .7695862   .2545783     3.02   0.003     .2706219    1.268551
  hispanic00 |  -.0089458   .0069163    -1.29   0.196    -.0225015    .0046099
      income |  -.0241489   .0126394    -1.91   0.056    -.0489217    .0006239
     owner00 |   .0235461   .0143687     1.64   0.101    -.0046161    .0517083
     dwnom1n |   2.761974   .2619813    10.54   0.000       2.2485    3.275448
     dwnom2n |   1.136417   .2339829     4.86   0.000     .6778186    1.595015
       _cons |  -.9697998   1.077738    -0.90   0.368    -3.082127    1.142528
------------------------------------------------------------------------------
```

R Program to Run RtoWINBUGS

```
#
#  Attempt to Run simple Probit Copying Ernesto's Code
#
library(arm)
setwd("C:/calvo")
data = read.dta("hdmg106_2009_fixed.dta")
attach(data)

V <-
cbind(ybush,black00,south,hispanic00,income,owner00,dwnom1n,dwnom2n)

N = nrow(data)
K = ncol(V)
data.data = list(N=N,K=K,V=V)
data.inits = function() {list(beta=runif(K,-2,2), delta=runif(N,-1,1))}
data.parameters = c("beta")
wide.sim = bugs(data.data, data.inits,
data.parameters,"h106_probit_BUGS_model.txt", n.chains=4, n.thin=1,
n.burnin=15000,n.iter=40000, debug=T)

detach(data)
```

WINBUGS Model Called by R2WINBUGS

```
model
{
#  X[,1]  = 1 if bush vote >= 50%
#  X[,2]  = 1 if Gore vote >= 50%
#  X[,3]  = Bush Percentage in CD
#  X[,4]  = Gore Percentage in CD
#  X[,5]  = Black Percentage in CD
#  X[,6]  = 1 if Southern State (11 states of Confederacy + OK + KY
#  X[,7]  = Hispanic Percentage in CD
#  X[,8]  = Median Family Income (in thousands) in CD
#  X[,9]  = Percent Owner-Occupied Housing
#  X[,10] = DW-NOMINATE 1st Dimension
#  X[,11] = DW-NOMINATE 2nd Dimension
#
#  PRIORS
#
         for (k in 1 : K) { beta[k] ~ dnorm(0,0.001)} # vague priors
#
# LIKELIHOOD
#
    for (i in 1 : N)  # loop over congressional districts
    {
#
         V[i,1] ~ dbern(p[i]);
         probit(p[i]) <- delta[i]
         delta[i] ~ dnorm(mu[i], 1.0)I(-4, 4)
         mu[i] <-
beta[1]+V[i,2]*beta[2]+V[i,3]*beta[3]+V[i,4]*beta[4]+V[i,5]*beta[5]+V[i
,6]*beta[6]+V[i,7]*beta[7]+V[i,8]*beta[8]
#
#  Borrowed From Simon Jackman
#
         llh[i] <- V[i,1]*log(p[i]) + (1-V[i,1])*log(1-p[i]);
    }
   sumllh <- sum(llh[]);
#
}
```

Log File From R2WINBUGS

```
display(log)
check(C:/DOCUME~1/ADMINI~1/LOCALS~1/Temp/Rtmp4n72cs/h106_probit_BUGS_model.txt)
model is syntactically correct
data(C:/DOCUME~1/ADMINI~1/LOCALS~1/Temp/Rtmp4n72cs/data.txt)
data loaded
compile(4)
model compiled
inits(1,C:/DOCUME~1/ADMINI~1/LOCALS~1/Temp/Rtmp4n72cs/inits1.txt)
chain initialized but other chain(s) contain uninitialized variables
inits(2,C:/DOCUME~1/ADMINI~1/LOCALS~1/Temp/Rtmp4n72cs/inits2.txt)
chain initialized but other chain(s) contain uninitialized variables
inits(3,C:/DOCUME~1/ADMINI~1/LOCALS~1/Temp/Rtmp4n72cs/inits3.txt)
chain initialized but other chain(s) contain uninitialized variables
inits(4,C:/DOCUME~1/ADMINI~1/LOCALS~1/Temp/Rtmp4n72cs/inits4.txt)
model is initialized
gen.inits()
command #Bugs:gen.inits cannot be executed (is greyed out)
```

```
thin.updater(1)
update(15000)
set(beta)
set(deviance)
dic.set()
update(25000)
coda(*,C:/DOCUME~1/ADMINI~1/LOCALS~1/Temp/Rtmp4n72cs/coda)
stats(*)
```

Node statistics

	mean	sd	MC error	2.5%	median	97.5%	start	sample
beta[1]	0.6562	0.8356	0.00638	-0.9668	0.6514	2.317	15001	100000
beta[2]	-0.011	0.006795	4.943E-5	-0.02414	-0.01107	0.002403	15001	100000
beta[3]	0.4022	0.2405	0.001883	-0.07176	0.4037	0.8701	15001	100000
beta[4]	-0.009365	0.006931	5.422E-5	-0.02291	-0.009402	0.00431	15001	100000
beta[5]	-0.03246	0.01346	1.107E-4	-0.05866	-0.03242	-0.006056	15001	100000
beta[6]	0.004265	0.01099	8.299E-5	-0.01747	0.004343	0.0256	15001	100000
beta[7]	2.781	0.234	0.001743	2.32	2.781	3.237	15001	100000
beta[8]	0.9219	0.2403	0.001982	0.451	0.9218	1.395	15001	100000
deviance	239.8	14.69	0.05129	211.9	239.5	269.4	15001	100000

dic.stats()

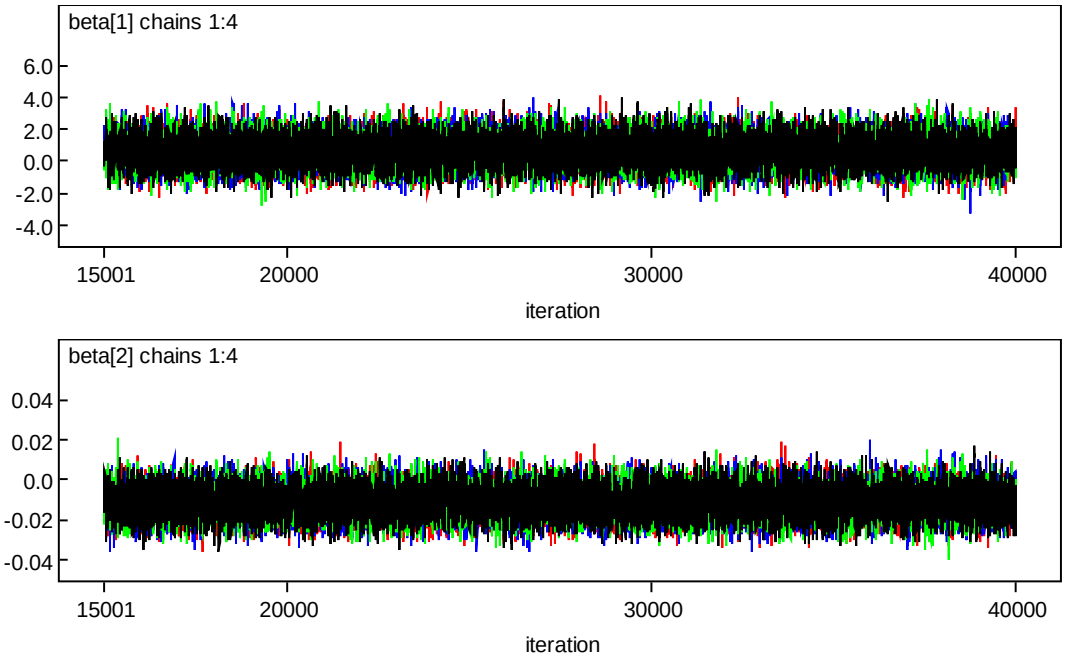
DIC

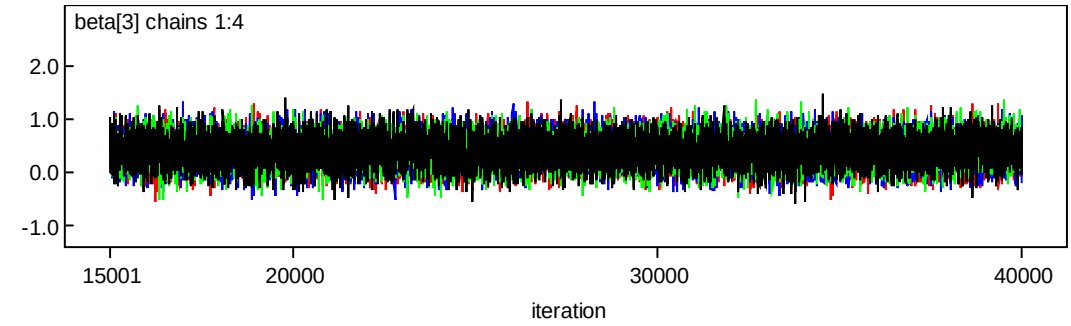
Dbar = post.mean of -2logL; Dhat = -2LogL at post.mean of stochastic nodes

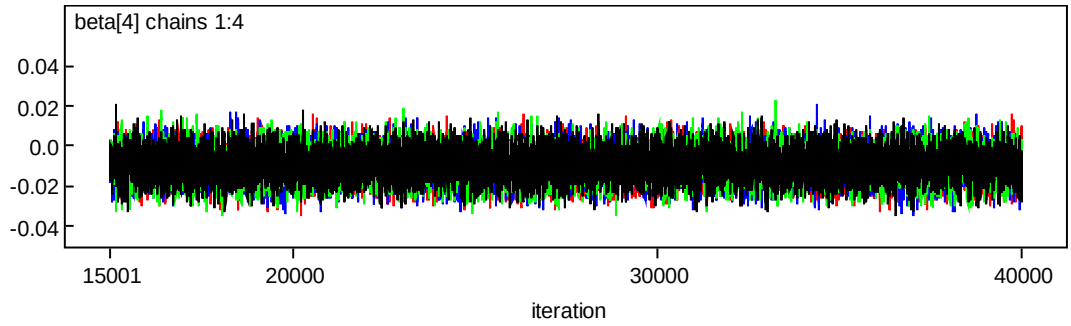
	Dbar	Dhat	pD	DIC
V	217.964	131.091	86.873	304.838
delta	21.844	19.205	2.639	24.483
total	239.809	150.296	89.512	329.321

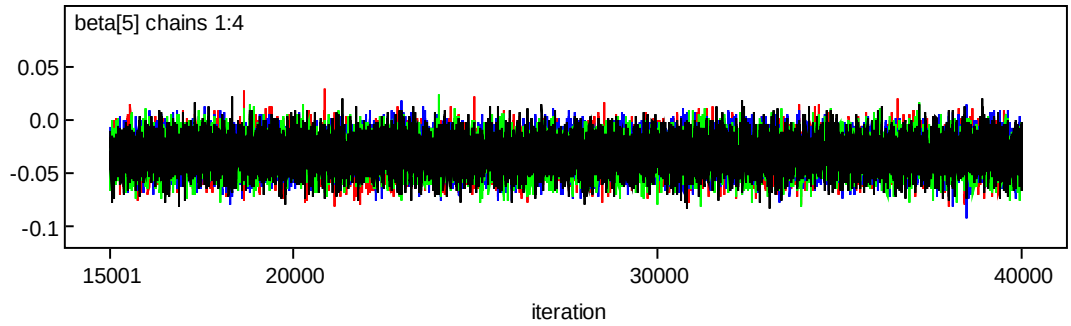
history(*,C:/DOCUME~1/ADMINI~1/LOCALS~1/Temp/Rtmp4n72cs/history.odc)

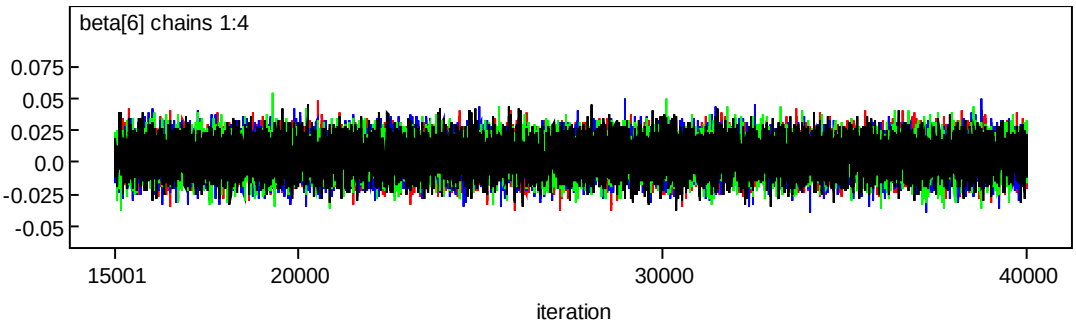
History

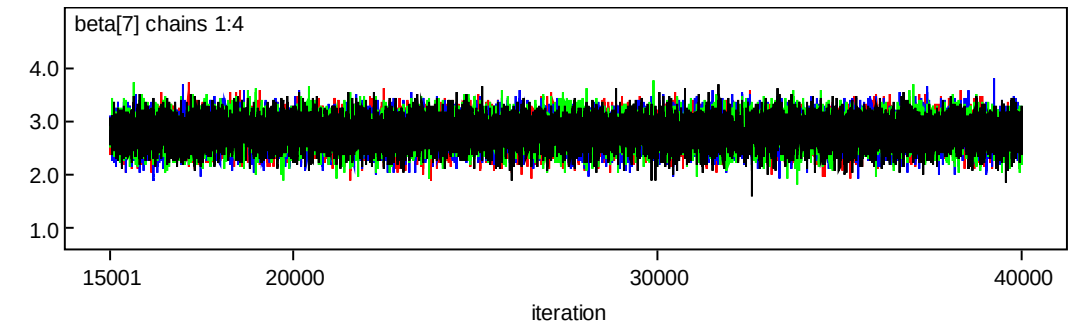


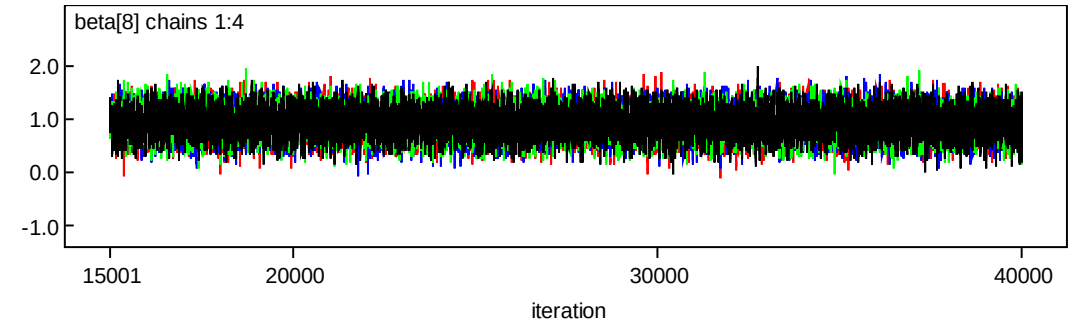

beta[3] chains 1:4
2.0
1.0
0.0
-1.0
15001
20000
30000
40000
iteration

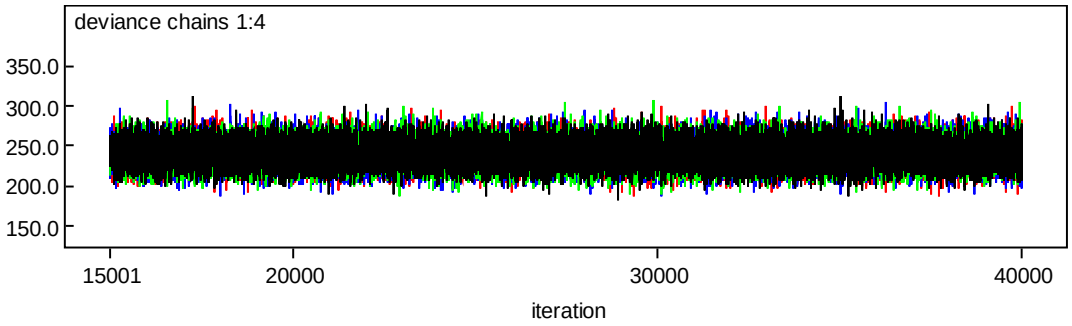

beta[4] chains 1:4
0.04
0.02
0.0
-0.02
-0.04
15001
20000
30000
40000
iteration


beta[5] chains 1:4
0.05
0.0
-0.05
-0.1
15001
20000
30000
40000
iteration


beta[6] chains 1:4
0.075
0.05
0.025
0.0
-0.025
-0.05
15001
20000
30000
40000
iteration


beta[7] chains 1:4
4.0
3.0
2.0
1.0
15001
20000
30000
40000
iteration

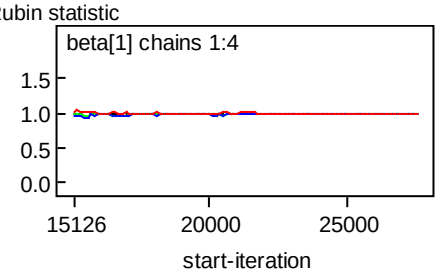


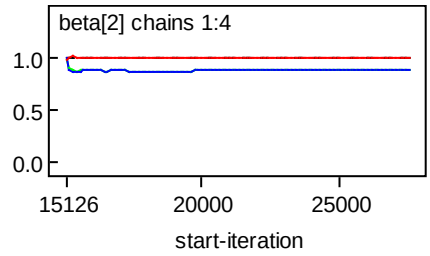


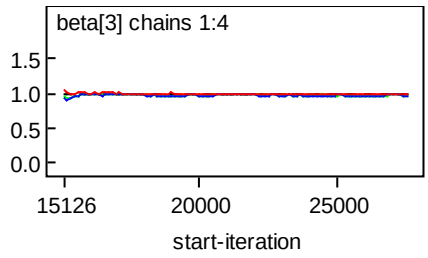
save(C:/DOCUME~1/ADMINI~1/LOCALS~1/Temp/Rtmp4n72cs/log.odc)
save(C:/DOCUME~1/ADMINI~1/LOCALS~1/Temp/Rtmp4n72cs/log.txt)

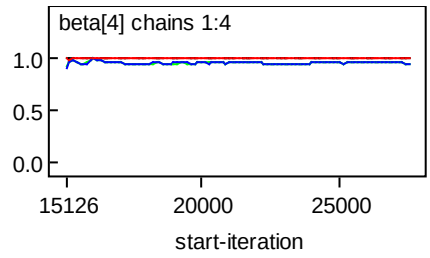
Output Done While WINBUGS Is Still Running

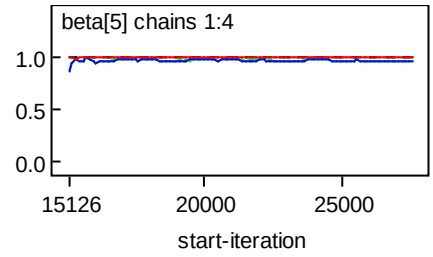
Gelman Rubin statistic

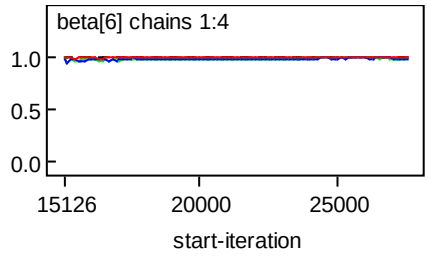


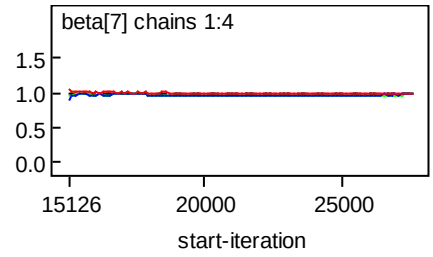


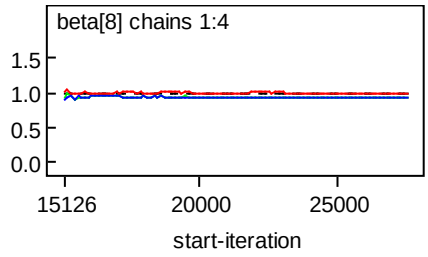




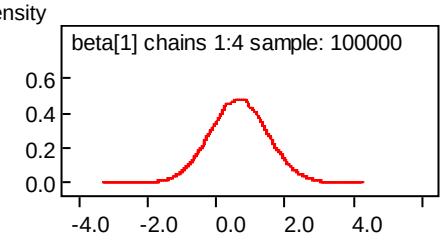


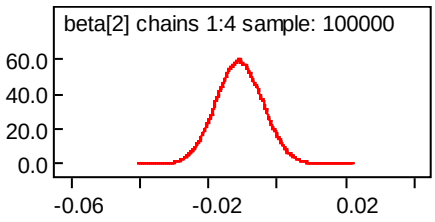


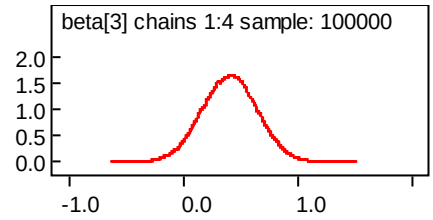


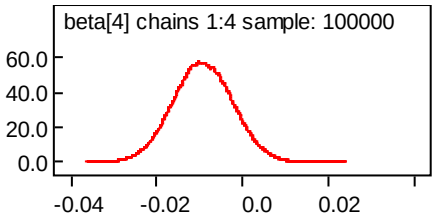


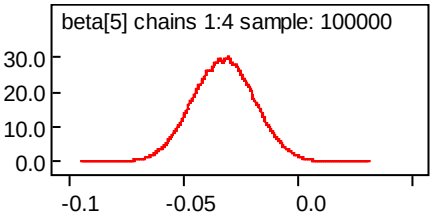
Kernel density

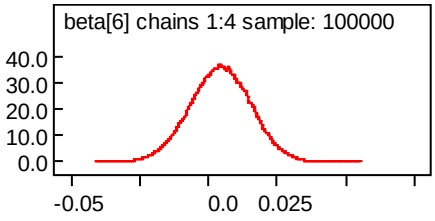


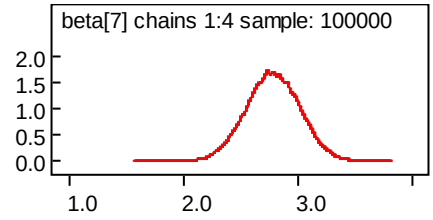


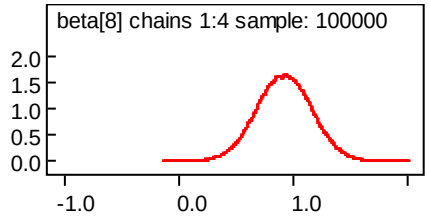




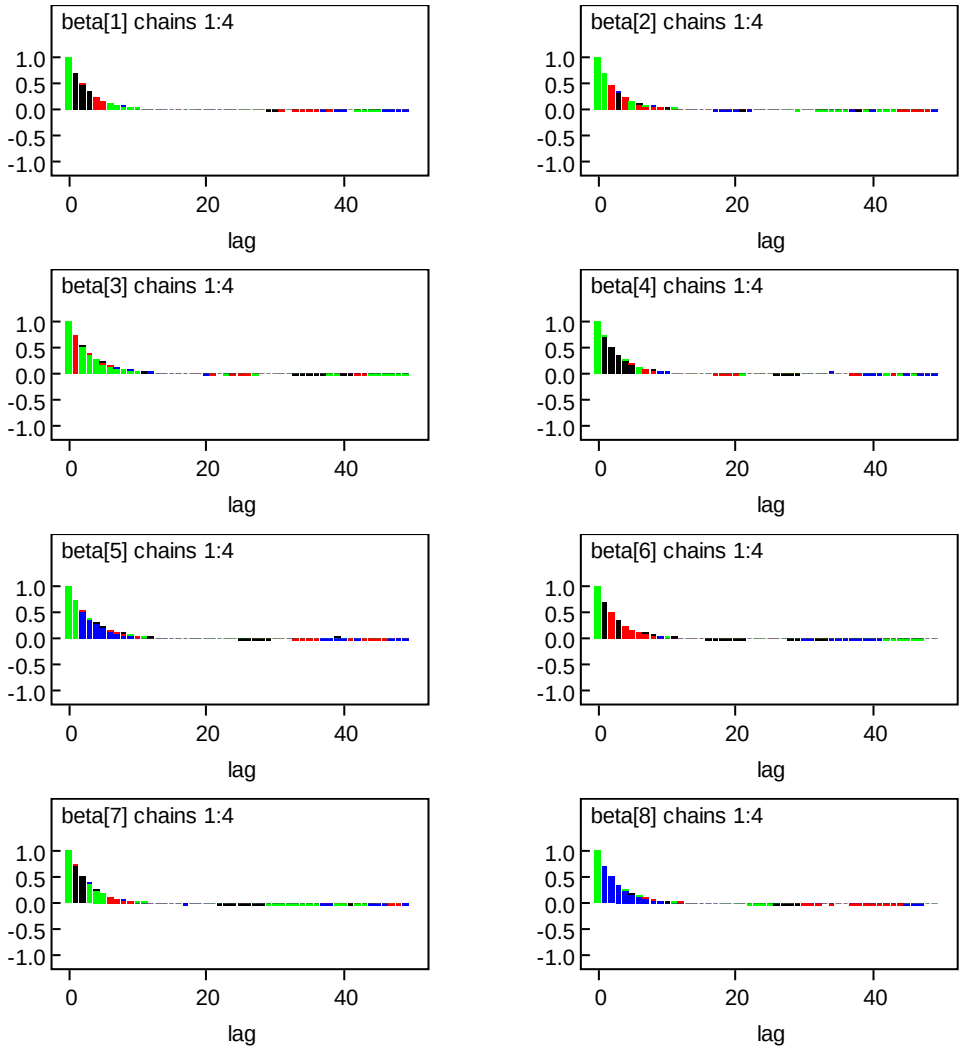








Autocorrelation function


beta[1] chains 1:4
beta[2] chains 1:4
beta[3] chains 1:4
beta[4] chains 1:4
beta[5] chains 1:4
beta[6] chains 1:4
beta[7] chains 1:4
beta[8] chains 1:4
1.0
0.5
0.0
-0.5
-1.0
0
20
40
lag