# CWVS: Critical Window Variable Selection

## CWVS\_Example

[1] Simulate data for analysis:

* Setting the reproducibility seed and initializing packages for data simulation:

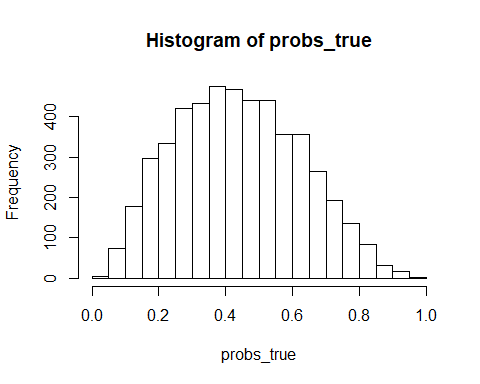
set.seed(4679)  
library(CWVS)  
library(boot) #Inverse logit transformation

* Setting the global data values:

n<-5000 #Sample size  
m<-27 #Number of exposure time periods  
x<-matrix(1,  
nrow=n,  
ncol=1) #Covariate design matrix  
z<-matrix(rnorm(n=(n\*m)),  
nrow=n,  
ncol=m) #Exposure design matrix  
for(j in 1:m){  
z[,j]<-(z[,j] - median(z[,j]))/IQR(z[,j]) #Data standardization (interquartile range)  
}

* Setting the values for the statistical model parameters:

beta\_true<- -0.30  
theta\_true<-rep(0.60, times=m)  
gamma\_true<-c(rep(0, times=12),  
rep(1, times=4),  
rep(0, times=11))  
alpha\_true<-gamma\_true\*theta\_true  
logit\_p\_true<-x%\*%beta\_true +  
z%\*%alpha\_true  
probs\_true<-inv.logit(logit\_p\_true)  
hist(probs\_true)



* Simulating the analysis dataset:

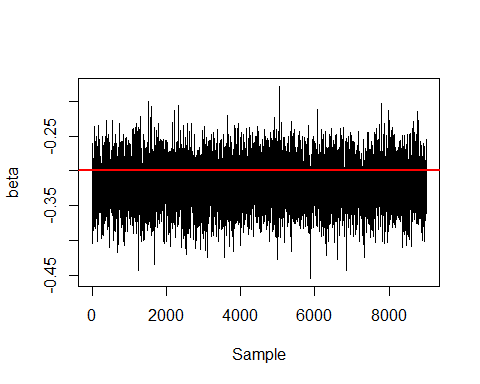
y<-rbinom(n=n,   
 size=1,   
 prob=probs\_true)

[2] Fit CWVS to identify/estimate critical windows of susceptibility:

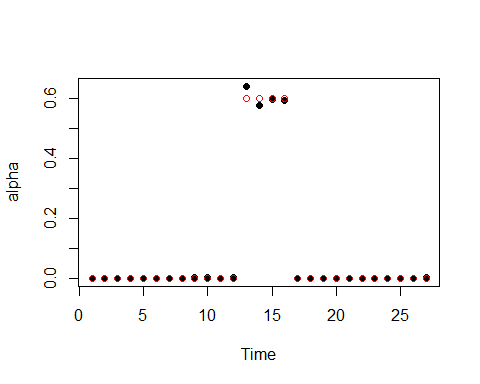
results<-CWVS(mcmc\_samples = 10000,  
 y = y, x = x, z = z,  
 metrop\_var\_phi1\_trans = 1.00,  
 metrop\_var\_phi2\_trans = 1.00,  
 metrop\_var\_A11\_trans = 0.05,  
 metrop\_var\_A22\_trans = 0.50,  
 metrop\_var\_A21 = 1.00)

## Progress: 10%  
## phi1 Acceptance: 35%  
## phi2 Acceptance: 36%  
## A11 Acceptance: 21%  
## A22 Acceptance: 26%  
## A21 Acceptance: 23%  
## \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
## Progress: 20%  
## phi1 Acceptance: 33%  
## phi2 Acceptance: 36%  
## A11 Acceptance: 20%  
## A22 Acceptance: 24%  
## A21 Acceptance: 21%  
## \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
## Progress: 30%  
## phi1 Acceptance: 33%  
## phi2 Acceptance: 37%  
## A11 Acceptance: 20%  
## A22 Acceptance: 27%  
## A21 Acceptance: 20%  
## \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
## Progress: 40%  
## phi1 Acceptance: 33%  
## phi2 Acceptance: 37%  
## A11 Acceptance: 20%  
## A22 Acceptance: 25%  
## A21 Acceptance: 18%  
## \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
## Progress: 50%  
## phi1 Acceptance: 34%  
## phi2 Acceptance: 37%  
## A11 Acceptance: 20%  
## A22 Acceptance: 25%  
## A21 Acceptance: 19%  
## \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
## Progress: 60%  
## phi1 Acceptance: 34%  
## phi2 Acceptance: 37%  
## A11 Acceptance: 20%  
## A22 Acceptance: 24%  
## A21 Acceptance: 19%  
## \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
## Progress: 70%  
## phi1 Acceptance: 34%  
## phi2 Acceptance: 37%  
## A11 Acceptance: 19%  
## A22 Acceptance: 22%  
## A21 Acceptance: 19%  
## \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
## Progress: 80%  
## phi1 Acceptance: 34%  
## phi2 Acceptance: 37%  
## A11 Acceptance: 19%  
## A22 Acceptance: 22%  
## A21 Acceptance: 18%  
## \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
## Progress: 90%  
## phi1 Acceptance: 34%  
## phi2 Acceptance: 37%  
## A11 Acceptance: 19%  
## A22 Acceptance: 23%  
## A21 Acceptance: 19%  
## \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
## Progress: 100%  
## phi1 Acceptance: 34%  
## phi2 Acceptance: 37%  
## A11 Acceptance: 19%  
## A22 Acceptance: 23%  
## A21 Acceptance: 20%  
## \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

plot(results$beta[1, 1001:10000],  
 type="l",  
 ylab="beta",  
 xlab="Sample")  
abline(h=beta\_true,  
 col="red",  
 lwd=2) #True value



plot(rowMeans(results$alpha[,1001:10000]),  
 pch=16,  
 ylab="alpha",  
 xlab="Time")  
points(alpha\_true,   
 col="red")



plot(rowMeans(results$gamma[,1001:10000]),  
 pch=16,  
 ylab="gamma",  
 xlab="Time")  
points(gamma\_true,   
 col="red")

