setwd("C:/R files BHMRA")

require(mcmcse); require(loo); library(MCMCvis)

library(ggplot2); library(reshape); options(scipen=999)

require(rube)

Sys.setenv(BUGSDIR="c:\\users\\p congdon\\documents\\WINBUGS14")

attach("DS\_12\_6.Rdata")

**# MODEL 1**

model1= "model { for (i in 1:n) {b[i,1:2] ~ dmnorm(nought[],Dinv[,])

b2[i] <- b[i,2]

for (t in 1:T) {Y[i,t] <- y[i,t]/1000; Y[i,t] ~ dnorm(mu[i,t],tau)

mu[i,t] <- beta0+b[i,1]+S[i,t]+b[i,2]\*S[i,t]

LL[n\*(t-1)+i] <- -0.5\*log(6.283\*s2)-0.5\*tau\*pow(Y[i,t]-mu[i,t],2)

log(L[n\*(t-1)+i]) <- LL[n\*(t-1)+i]

S[i,t] <- s[age[i,t]-11]}}

# birthweight profiles by matage according to different b2

for (m in 15:42) {ageprof[1,m] <- beta0+s[m-11]\*(1+sig.b[2]);

ageprof[2,m] <- beta0+s[m-11]

ageprof[3,m] <- beta0+s[m-11]\*(1-sig.b[2])}

# RW2 prior in matage

w[1] <- 2; adj[1] <- 2; w[2] <- -1; adj[2] <- 3; nage[1] <- 2

nage[2] <- 3 ; w[3] <- 2; adj[3] <- 1; w[4] <- 4; adj[4] <- 3;

w[5] <- -1; adj[5] <- 4;

for (x in 3:(X-2)) {nage[x] <- 4

w[6+(x-3)\*4] <- -1; adj[6+(x-3)\*4] <- x-2

w[7+(x-3)\*4] <- 4; adj[7+(x-3)\*4] <- x-1

w[8+(x-3)\*4] <- 4; adj[8+(x-3)\*4] <- x+1

w[9+(x-3)\*4] <- -1; adj[9+(x-3)\*4] <- x+2}

w[(X-4)\*4 + 6] <- 2; adj[(X-4)\*4 + 6] <- X

w[(X-4)\*4 + 7] <- 4; adj[(X-4)\*4 + 7] <- X-2

w[(X-4)\*4 + 8] <- -1; adj[(X-4)\*4 + 8] <- X-3; nage[X-1] <- 3

w[(X-4)\*4 + 9] <- 2; adj[(X-4)\*4 + 9] <- X-1

w[(X-4)\*4 + 10] <- -1; adj[(X-4)\*4 + 10] <- X-2; nage[X] <- 2

s[1:X] ~ car.normal(adj[], w[], nage[], taus)

# other priors

beta0 ~ dnorm(3,0.001)

Dinv[1:2,1:2] ~ dwish(ScD[,],2)

D[1:2,1:2] <- inverse(Dinv[,]);

for (j in 1:2) {sig.b[j] <- sqrt(D[j,j])}

tau ~ dgamma(1,0.01)

s2 <- 1/tau

taus ~ dgamma(5,1)}"

**# Initial values and estimation**

init1 <- list(tau=0.01,beta0=3,taus=1,

Dinv=structure(.Data=c(10,0,0,10),.Dim=c(2,2)),s=rep(0,31))

init2 <- list(tau=0.1,beta0=3,taus=10,

Dinv=structure(.Data=c(10,0,0,10),.Dim=c(2,2)),s=rep(0,31))

inits <- list(init1,init2)

M1 = rube(model1, DS\_12\_6, inits)

summary(M1)

pars <- c("D","s","ageprof")

S1 = rube(model1, DS\_12\_6, inits, pars, n.burn=500, n.thin=1, n.chains=2,n.iter=10000)

summary(S1,limit=50)

**# fit measures**

nT <- DS\_12\_6$n\*DS\_12\_6$T

pars <- c("LL","b2")

S1.LL = rube(model1, DS\_12\_6, inits, pars, n.burn=5000, n.thin=1, n.chains=2,n.iter=10000)

**# pointwise LOO-IC**

LOO=loo(S1.LL$sims.list$LL)

looPW=LOO$pointwise[,3]

mother=rep(1:878,5); infant= rep(1:5, each = 878)

df=data.frame(looPW,mother,infant)

df=df[order(-df$looPW),]

head(df)

**# extreme positive and negative b2**

b2=apply(S1.LL$sims.list$b2,2,mean)

n <- DS\_12\_6$n

seq=seq(1:878)

list.b2 <- data.frame(b2,seq)

list.b2=list.b2[order(-list.b2$b2),]

head(list.b2)

tail(list.b2)

**# histogram of b2**

hist(b2, breaks=20, prob=T, col="gray",

xlab=expression(paste("Posterior mean b"[2])), ylim=c(0, 0.75),

main=expression(paste("Figure 12.8.2 Histogram of b"[2])))