require(jagsUI)

require(loo)

setwd("C:/R files BHMRA")

attach("DS\_9\_12.Rdata")

**#**

**# Constant Variance Common Factor**

**#**

**cat("**model { for (t in 1:T) {

y[t,1:P] ~ dmnorm(mu[t,1:P],Tau[,])

y.new[t,1:P] ~ dmnorm(mu[t,1:P],Tau[,])

# multivariate normal log-likelihood

LL[t] <- -P\*log(2\*pi)/2 + logdet(Tau)/2 - t(y[t,] - mu[t,]) %\*% Tau %\*% (y[t,] - mu[t,])/2

for (k in 1:P) { mu[t,k] <- alph[k]+lam[k]\*F[t]

g[t,k] <- pow(y[t,k]-y.new[t,k],2)}}

# Factor model, with unknown variance

F[1] <- 0

for (t in 2:T) {F[t] ~ dnorm(F[t-1], 1/sigF^2)}

sigF ~ dunif(0,10);

# prior on loadings

lam[1] <- 1

for (k in 2:P) {lam[k] <- lambda.r[k-1]}

for (k in 1:PM) {lambda.r[k] ~ dnorm(0,1)}

# Residual Precision andd Covariance

Tau[1:P,1:P] ~ dwish(Q[,],P)

Sigma[1:P,1:P] <- inverse(Tau[,])

for (j in 1:P) { alph[j] ~ dnorm(0,0.001)

# V are observed variances

for (k in 1:P) {Q[j,k] <- P\*V[j]\*equals(j,k)}}

# Predictive Fit Measure

G <- sum(g[,]) }

", file="model1.jag")

**# initial values and estimation**

inits1 <- list(alph=c(5,5,5),sigF=0.05,lambda.r=c(1,1))

inits2 <- list(alph = c(4.75,4.79,4.79),lambda.r = c(0.78,0.90),sigF=0.1)

inits=list(inits1,inits2)

pars <- c("sigF","G","LL","F","y.new")

R1=autojags(DS\_9\_12, inits, pars,model.file="model1.jag",2,iter.increment=5000, n.burnin=500,Rhat.limit=1.1, max.iter=50000, seed=1234)

R1$summary

**# Fit Measures**

loo(R1$sims.list$LL)

**# variances of replicate data**

y.new.samps=R1$sims.list$y.new

var=apply(y.new.samps[1:10000,,],c(2,3),sd)^2

H <- sum(var)

**#**

**# Factor with Non-Constant Variance**

**#**

**cat("**model { for (t in 1:T) { y[t,1:P] ~ dmnorm(mu[t,1:P],Tau[,])

y.new[t,1:P] ~ dmnorm(mu[t,1:P],Tau[,])

# multivariate normal log-likelihood

LL[t] <- -P\*log(2\*pi)/2 + logdet(Tau)/2 - t(y[t,] - mu[t,]) %\*% Tau %\*% (y[t,] - mu[t,])/2

for (k in 1:P) { mu[t,k] <- alpha[k]+lambda[k]\*F[t]

g[t,k] <- pow(y[t,k]-y.new[t,k],2)}}

# Factor model, non-constant variance

F[1] <- 0

eta[1] ~ dnorm(0,1)

for (t in 2:T) {F[t] ~ dnorm(F[t-1], 1/exp(eta[t]))

# log variances

eta[t] ~ dnorm(eta[t-1],tau.eta)}

tau.eta ~ dgamma(1,0.001)

# loadings

lambda[1] <- 1

for (k in 2:P) {lambda[k] <- lambda.r[k-1]}

for (k in 1:PM) {lambda.r[k] ~ dnorm(0,1)}

# Residual Precision

Tau[1:P,1:P] ~ dwish(Q[,],P)

for (j in 1:P) {for (k in 1:P) {Q[j,k] <- P\*V[j]\*equals(j,k)}}

# Predictive Fit Measure

G <- sum(g[,])

# other priors

for (j in 1:P) { alpha[j] ~ dnorm(0,0.01)}}

", file="model2.jag")

**# initial values and estimation**

inits1 <- list(alpha=c(5,5,5),lambda.r=c(1,1),eta=rep(0,100),tau.eta=1)

inits2 <- list(alpha = c(4.75,4.79,4.79),lambda.r = c(0.78,0.90),eta=rep(0.1,100),tau.eta=10)

inits=list(inits1,inits2)

pars <- c("G","LL","F","y.new","eta")

R2 = autojags(DS\_9\_12, inits, pars,model.file="model2.jag",2,iter.increment=5000, n.burnin=500,Rhat.limit=1.1, max.iter=100000, seed=1234)

R2$summary

**# Fit Measures**

loo(R2$sims.list$LL)

**# variances of replicate data**

y.new.samps=R2$sims.list$y.new

var=apply(y.new.samps[1:10000,,],c(2,3),sd)^2

H <- sum(var)