# SEM SIMULATIONS FOR REGRESSION MODELS

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#

# Load the relevant libraries:

library(mvtnorm)

library(lavaan)

#

# Generate the data:

gendata <- function(n1,n2,mean1,mean2,sigma1,sigma2) {

mat1 <- rmvnorm(n1, mean = mean1, sigma = sigma1)

mat2 <- rmvnorm(n2, mean = mean2, sigma = sigma2)

z <- c(rep(-1,n1),rep(1,n2))

mattot <- cbind(rbind(mat1,mat2),z)

colnames(mattot) <- c("x","y","z")

mattot

}

#

# Regression models:

# Unequal y-error-variances with unequal x-variances models.

compreg3 <- function(n1,n2,mean1,mean2,sigma1,sigma2) {

tdata <- as.data.frame(gendata(n1,n2,mean1,mean2,sigma1,sigma2))

# Equal-x-variances model

mod1<- '

y ~ x

x ~ 1

y ~ 1

y ~~ y

x ~~ equal(c("","x~~x"))\*x

'

fit1 <- sem(mod1, data = tdata, group = "z", likelihood = "wishart")

fit1chi <- fitMeasures(fit1, c("chisq", "df"))

# Equal y-error-variances model

# (Note that this does NOT test equal y-variances. It is the same as

# if we use the group.equal = "residuals" option in the sem command.

mod1b<- '

y ~ x

x ~ 1

y ~ 1

y ~~ equal(c("","y~~y"))\*y

x ~~ x

'

fit1b <- sem(mod1b, data = tdata, group = "z", likelihood = "wishart")

fit1bchi <- fitMeasures(fit1b, c("chisq", "df"))

# Equal slopes model with unequal x-variances and unequal y-variances:

mod2<- '

y ~ equal(c("","y~x"))\*x

x ~ 1

y ~ 1

y ~~ y

x ~~ x

'

fit2 <- sem(mod2, data = tdata, group = "z", likelihood = "wishart")

fit2chi <- fitMeasures(fit2, c("chisq", "df"))

rbind(fit1chi,fit1bchi,fit2chi)

}

#

# Loop the models many (sim) times and count the number of rejections:

regsim3 <- function(sim,n1,n2,mean1,mean2,sigma1,sigma2) {

outmat <- matrix(c(rep(0,3\*sim)),ncol = 3)

for (i in 1:sim) {

treg <- compreg3(n1,n2,mean1,mean2,sigma1,sigma2)

outmat[i,1] <- ifelse(1 - pchisq(treg[1,1],treg[1,2])<=.05,1,0)

outmat[i,2] <- ifelse(1 - pchisq(treg[2,1],treg[2,2])<=.05,1,0)

outmat[i,3] <- ifelse(1 - pchisq(treg[3,1],treg[3,2])<=.05,1,0)

 }

reject <- rbind(colSums(outmat),c(rep(sim,3)),c(n1,n2,NA))

colnames(reject) <- c("x-var","y-var","slopes")

rownames(reject) <- c("rejections","runs","samples")

reject

}

#

# Example of a 20,000 run simulation with variance-covariance

# matrices both = matrix(c(1,1,1,2),ncol = 2):

> T7070r1 <- regsim3(20000,70,70,c(0,0),c(0,0), matrix(c(1,1,1,2),ncol = 2),matrix(c(1,1,1,2),ncol = 2)); T7070r1