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# Example 7.3 #

# Haircut and Liquidity Shrinkage #

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# 1. Liquidity index regression

db.liq <-as.data.frame(read.csv("Chap7liquidity.csv",header = TRUE, sep = ";", dec="."))

lm.illiq<- lm(formula=ILLIQ ~ INV+CONS, data=db.liq)

summary(lm.illiq)

illiq.coef=as.matrix(lm.illiq$coef)

# 2. Liquidity index simulation

sim.macrov<-as.data.frame(read.csv("Chap7simmacro.csv",

header = FALSE, sep = ",", dec="."))

sim.macrov.1<-cbind(matrix(1,nrow=(nrow(sim.macrov)),

ncol=1),sim.macrov[,4:5])

colnames(sim.macrov.1)<-c("INTERCEPT","INV", "CONS")

n.sims=1000

illiq.sim=as.matrix(t(illiq.coef))%\*%as.matrix(t(sim.macrov.1))

illiq.sim.norm=(illiq.sim-min(illiq.sim))/(max(illiq.sim)

-min(illiq.sim))

# 3. Illiquidity flag

illiq.sim1<- matrix(0, nrow=1,ncol=n.sims)

threshold=0.6 # Liquidity threshold

for (j in 1:n.sims)

 {

 verif<- illiq.sim.norm[,j]-threshold

 if(verif>0)

 {

 illiq.sim1[,j]<- 1

 }

}

# 4. Haircut applied to assets

sim.inf=0

sim.sup=0.4

illiq.sim.bernoulli<- matrix(0, nrow=3,ncol=n.sims)

for (j in 1:n.sims)

{

 verif<- illiq.sim1[,j]-0

 if(verif>0)

 {

 illiq.sim.bernoulli[,j]<- as.matrix(runif(3,

 min=sim.inf, max=sim.sup))

 }

}

asset=as.matrix(c(40,60,100))

asset.sim<- matrix(0, nrow=3,ncol=n.sims)

for (i in 1:3)

for (j in 1:n.sims)

{

asset.sim[i,j]=asset[i,]\*(1-illiq.sim.bernoulli[i,j])

}

asset.sum<-colSums(asset.sim)

# 5. Liquidity shrinking

liq.acc.inf<-0.4

liq.acc.sup<-0.5

liq.access<- 10 # Buffer B\_t

market.liq<- matrix( liq.access, nrow=1, ncol=n.sims)

for (j in 1:n.sims)

{

 verif<- illiq.sim1[,j]-0

 if(verif>0)

 {

 market.liq[,j]<- runif(1,min=liq.acc.inf,

 max=liq.acc.sup)\* liq.access

 }

}

# Figure

par(mfrow = c(1, 2)) #in the case of n=2,3,... plots vertically printed

# 1

hist(asset.sum, breaks = 20, col="lightblue",

main="Assets",axes = TRUE,ylab="Frequency",xlab="Value - Haircut", cex.main = 2, font.main= 2, col.main= "black",cex.lab = 2.0, font.lab = 2.0, col.lab = "black", cex.axis=2)#,axes = TRUE # 8

# 2

hist(market.liq, breaks = 20, col="lightblue",

main="Liquidity Buffer",axes = TRUE,ylab="",xlab="Liquidity - Shrinking", cex.main = 2, font.main= 2, col.main= "black",cex.lab = 2.0, font.lab = 2.0, col.lab = "black", cex.axis=2)#,axes = TRUE # 8