X=matrix(c(15,120,19.31,111.79,99.77,120,1240,164.3,1035.9,875.6,19.31,

164.3,25.218,148.98,131.22,111.79,1035.9,148.98,953.86,799.02,

99.770,875.60,131.22,799.02,716.67),5,5)

Y=matrix(c(3.0500,26.004,3.9926,23.521,20.732),5,1)

solve(t(X)%\*%X)%\*%t(X)%\*%Y

##############

test\_dta=read.table("tst.csv",sep=",",header=T)#data.frame

cor(test\_dta[,-2])

attach(test\_dta)

X1=cbind(1,T,rGNP,R)#X2：inflation;rbind：rowbind

X2=cbind(P)

y=matrix(test\_dta[,1],NROW(test\_dta),1)

MX1=diag(NROW(test\_dta))-X1%\*%solve(t(X1)%\*%X1)%\*%t(X1)

#I-X%\*%(t(X)%\*%X)^{-1}%\*%t(X);residual maker matrix

y\_star=MX1%\*%y

x2\_star=MX1%\*%X2

cor(y\_star,x2\_star)

X1=cbind(1,rGNP,R,P)

X2=cbind(T)

y=matrix(test\_dta[,1],NROW(test\_dta))

MX1=diag(NROW(test\_dta))-X1%\*%solve(t(X1)%\*%X1)%\*%t(X1)

y\_star=MX1%\*%y

x2\_star=MX1%\*%X2

cor(y\_star,x2\_star)

##########centring matrix

mean\_reg=lm(y~1)

summary(mean\_reg)

derivation=residuals(mean\_reg)#y-y^{hat};y\_hat=xb;e=y-xb

N=length(y)

i=matrix(1,N,1)

M0=diag(1,N)-1/N\*i%\*%t(i)#centringmatrix

derivation2=M0%\*%y

derivation3=y-mean(y)

cbind(derivation,derivation2,derivation3)

###########4.1

n=10000

omega=rnorm(n,0,1)

x=rnorm(n,0,1)

sigma=0.5\*omega

y=0.5+0.5\*x+sigma#DGP:datagenerationprocess

data=data.frame(y,x)

lm1=lm(y~x)

summary(lm1)

b\_store=NULL\*\*\*\*\*\*kongzhi

for(tin1:1000){#loop

index=sample(seq(1,n,1),1000)

#sub\_reg=lm(y~x-1,data=data,subset=index)

#b\_store[t]=coef(sub\_reg)

x\_sub=x[index]

y\_sub=y[index]

b\_store[t]=solve(t(x\_sub)%\*%x\_sub)%\*%t(x\_sub)%\*%y\_sub#(X'X)-1X'y

}

plot(density(b\_store))

hist(b\_store)\*\*\*\*\*\*\*\*nullzidongxvanze heshide fanwei

######

n=10000

var=5

X=rnorm(n,0,sqrt(var))

t(X)%\*%X/n

####

n=10000

X1=rnorm(n)

X2=rnorm(n)

X=cbind(X1,X2)

beta=c(0.3,0.6)

Y=X%\*%beta+rnorm(n)

result=lm(Y~X)

summary(result)

#var(b|x)=sigma^2\*(X'X)^(-1)

M=(diag(n))-X%\*%solve(t(X)%\*%X)%\*%t(X)

e=M%\*%Y\*\*\*10000\*1

s2=t(e)%\*%e/(n-2)\*\*\*1\*1

s2\_unscaled=t(e)%\*%e/n\*\*\*1\*1

lm\_vcov=matrix(rep(s2,4),2,2)\*solve(t(X)%\*%X)#est.var

sqrt(lm\_vcov)\*\*\*2\*2

lm\_vcov\_unscaled=matrix(rep(s2\_unscaled,4),2,2)\*solve(t(X)%\*%X)

sqrt(lm\_vcov\_unscaled)\*\*\*2\*2

################

#install.packages("numDeriv")

require(numDeriv)#library(numDeriv)

require(quantreg)

dat=read.table("TableF2-2.csv",header=T,sep=",")

attach(dat)

t=NROW(dat)\*\*\*t hang

G=1000000\*GASEXP/(GASP\*POP)

model=lm(log(G[2:t])~log(GASP[2:t])+log(INCOME[2:t])+log(PNC[2:t])+log(PUC[2:t])+log(G[1:(t-1)]),data=dat)

summary(model)

s2=sum(residuals(model)^2)/(t-7) \*\*\*\*52-7=45ziyoudu

sqrt(0.00021705)

#model=lm(log(G)~log(GASP)+log(INCOME)+log(PNC)+log(PUC),data=dat)

#summary(model)\*\*\*52-5=47

Signif.codes:0‘\*\*\*’0.001‘\*\*’0.01‘\*’0.05‘.’0.1‘’1

res=residuals(model)

s2=t(res)%\*%res/(t-7)

s2=s2[1,1] \*\*\*\*0.002686022

X=cbind(1,log(GASP[2:t]),log(INCOME[2:t]),log(PNC[2:t]),log(PUC[2:t]),log(G[1:(t-1)]))

est.var=solve(t(X)%\*%X)\*s2#\*\*\*\*\*est.var=s^2\*(x/X)-1 6\*6

sd=sqrt(diag(est.var))\*\*\*\*1\*6

f1=function(b){

b[2]/(1-b[6])

}

f2=function(b){

b[3]/(1-b[6])

}

g2=jacobian(f1,coef(model))\*\*\*\*1\*6

g3=jacobian(f2,coef(model)) \*\*\*\*1\*6

delta1=g2%\*%est.var%\*%t(g2)\*\*\*\*0.0230941

delta2=g3%\*%est.var%\*%t(g3)\*\*\*\*0.02636925

#############QR##########

rq\_result<rq(log(G[2:t])~log(GASP[2:t])+log(INCOME[2:t])+log(PNC[2:t])+log(PUC[2:t])+log(G[1:(t-1)]),data=dat,tau=0.5)

summary(rq\_result)\*\*\*\*\*fenweishuhuigui

#######################

dat2=read.table("TableF4-1.csv",header=T,sep=",")

attach(dat2)

surface=HEIGHT\*WIDTH

aspect=HEIGHT/WIDTH

X=cbind(1,log(surface),aspect)

Y=log(PRICE)

m1=lm(log(PRICE)~log(surface)+aspect)

summary(m1)\*\*\*\*\*zyd427

quanreg=function(b){

mu=X%\*%b

LAD=sum(abs(Y-mu))

return(LAD)

}

m2=optim(par=c(0,0,0),quanreg)

rq\_result<-rq(log(PRICE)~log(surface)+log(aspect),tau=0.5)

summary(rq\_result)

########################################

K=100

R=100

b\_ols=matrix(0,3,K)

b\_lad=matrix(0,3,K)

for(kin1:K){

obs\_list=sample(seq(1,420,1),R,replace=F)

b\_ols[,k]=coef(lm(log(PRICE[obs\_list])~log(surface[obs\_list])+aspect[obs\_list]))

b\_lad[,k]=coef(rq(log(PRICE[obs\_list])~log(surface[obs\_list])+aspect[obs\_list]),tau=0.5)

}

rowMeans(b\_ols)

rowMeans(b\_lad)

apply(b\_ols,1,sd)#

apply(b\_lad,1,sd)

###############P92

n=10000

x=rnorm(n,0,1)

plot(density(x))#PDF

critical\_value1=qnorm(0.025,0,1)

critical\_value2=qnorm(0.95+0.025,0,1)

abline(v=critical\_value1,col=2)

abline(v=critical\_value2,col=2)

#############4.8

qt(0.025,47)

qt(0.975,47)

#############4.10

plot(hist(PRICE,30))

X11()

plot(hist(log(PRICE),30))

m1=lm(log(PRICE)~log(surface)+aspect)

summary(m1)

vcov(m1)

x0=c(1,log(25.6\*31.9),25.6/31.9)

prediction=coef(m1)%\*%x0

mean(log(PRICE))

res=residuals(m1)

s2=t(res)%\*%res/(430-3)

s2=s2[1,1]

X=cbind(1,log(surface),aspect)

est.var=solve(t(X)%\*%X)\*s2

var\_x0=s2+x0%\*%est.var%\*%x0#4-46

sd\_x0=sqrt(var\_x0)

x0\_upper=prediction+1.96\*sd\_x0

x0\_lower=prediction-1.96\*sd\_x0

mean(exp(res))#smearing estimator

exp(prediction)\*mean(exp(res))

exp(x0\_lower)

exp(x0\_upper)

######grid search

mu0=prediction

sigma0=sd\_x0\*\*\*\*1.104028

LO=exp(x0\_lower)

decrement=0.005

#K=100

denL=1

denU=0

while(denL>denU){

LO=LO-decrement

denL=dlnorm(LO,mu0,sigma0)

pL=pnorm((log(LO)-mu0)/sigma0)#plnorm(LO,mu0,sigma0),duishuzhengtaifenbu duishubianhuan bianwei zhengtaifenbu

UO=exp(sigma0\*qnorm(pL+0.95)+mu0)#qlnorm(pL+0.95,mu0,sigma0)

denU=dlnorm(UO,mu0,sigma0)

}\*\*\*\*0.01034464

#######Lonleydata

dat3=read.table("TableF4-2.csv",header=T,sep=",")

attach(dat3)

m1=lm(EMPLOY~I(YEAR-1947)+PRICE+GNP+ARMED)

summary(m1)\*\*\*\*zyd11

R1=lm(PRICE~I(YEAR-1947)+GNP+ARMED)

1/(1-0.9868)#VIF

#########PCA

datpca=read.table("TableF4-3.csv",header=T,sep=",")

attach(datpca)

m1=lm(log(BOX)~ACTION+COMEDY+ANIMATED+HORROR+I(MPRATING==1)+

I(MPRATING==2)+I(MPRATING==3)+log(BUDGET)+SEQUEL+STARPOWR)

summary(m1)\*\*\*\*zyd51

buzz1=log(ADDICT)

buzz2=log(CMNGSOON)

buzz3=log(FANDANGO)\*\*\*\*qvduishu qvchu guimo dyingxiang

buzz4=CNTWAIT3

N=nrow(datpca)

M0=diag(N)-1/N

buzz=cbind(buzz1,buzz2,buzz3,buzz4)\*\*\*\*62\*4

#colMeans(M0%\*%buzz)

Z=apply(M0%\*%buzz,2,function(x)x/(sd(x)))

V=1/(N-1)\*t(Z)%\*%Z#why??xiangguanxishu matrix 1/61-4\*4

#cor(Z)

C=eigen(V)\*\*\*4\*4

sum(eigen(V)$values/4)

cor(eigen(V)$vectors)

c1=C$vectors[,1]

c2=C$vectors[,2]

Zc1=Z%\*%c1zhuchengfen

\*\*\*\*jieshi sigebianliang d dabufen bianhua

Zc2=Z%\*%c2

cor(Zc1,Zc2)

cor(c1,c2)

m2=lm(log(BOX)~ACTION+COMEDY+ANIMATED+HORROR+I(MPRATING==1)+

I(MPRATING==2)+I(MPRATING==3)+log(BUDGET)+SEQUEL+STARPOWR+Zc1)

summary(m2)\*\*\*\*\*zyd50

########5.1

qnorm(0.95)=1.64

qt(0.95,430-3)=1.64

pnorm(1,1.33372,0.09072)=0.000117272

qnorm(0.975)=1.96

##########kafangfenbu(gailvzhi,ziyoudu)

############5.3

dat53=read.table("TableF5-2.csv",header=T,sep=",")

attach(dat53)

t=seq(2,NROW(dat53),1)

m1=lm(log(REALINVS[-1])~TBILRATE[-1]+INFL[-1]+log(REALGDP[-1])+t)

summary(m1)\*\*\*198zyd

X=cbind(1,TBILRATE[-1],INFL[-1],log(REALGDP[-1]),t)

Y=log(REALINVS[-1])

M=diag(NROW(dat53)-1)-X%\*%solve(t(X)%\*%X)%\*%t(X)

\*\*\*\*\*203\*203

e=M%\*%Y\*\*\*\*203\*1

s2=t(e)%\*%e/(NROW(dat53)-1-5)\*\*nhang-jiejvx-bianlianggeshu

s2=s2[1,1]

est.var=s2\*solve(t(X)%\*%X)

b=coef(m1)

plus=b[2]+b[3]

f1=function(b){

b[2]+b[3]

}

g1=jacobian(f1,b)

g1\_sd=sqrt(g1%\*%est.var%\*%t(g1))

g1\_ttest=plus/g1\_sd

f2=function(b){

b[4]

}

f3=function(b){

b[5]

}

q=matrix(c(0,1,0),3,1)

R=rbind(jacobian(f1,b),jacobian(f2,b),jacobian(f3,b))

wald=t(R%\*%b-q)%\*%solve(R%\*%solve(t(X)%\*%X)%\*%t(R))%\*%(R%\*%b-q)/(s2)

qchisq(0.95,3)

1-pchisq(wald,3)

F=t(R%\*%b-q)%\*%solve(R%\*%est.var%\*%t(R))%\*%(R%\*%b-q)/3

1-pf(F,3,203-5)

###########5.4

dat54=read.table("TableF5-3.csv",header=T,sep=",")

attach(dat54)

m54=lm(log(VALUEADD)~log(LABOR)+log(CAPITAL)+I(0.5\*log(LABOR)^2)+I(0.5\*log(CAPITAL)^2)

+I(log(LABOR)\*log(CAPITAL)))

N=NROW(dat54)27

M0=diag(N)-1/N27\*27

X=cbind(1,log(LABOR),log(CAPITAL),I(0.5\*log(LABOR)^2),I(0.5\*log(CAPITAL)^2)

,I(log(LABOR)\*log(CAPITAL)))

M=diag(N)-X%\*%solve(t(X)%\*%X)%\*%t(X)

\*\*\*\*\*27\*27redi matrix

Y=log(VALUEADD)

e=M%\*%Y\*\*\*27\*1

ee=t(e)%\*%e

R2=1-t(e)%\*%e/t(Y)%\*%M0%\*%Y\*\*\*R-square

s2=ee/(N-6)\*\*\*S-square

est.var=s2[1,1]\*solve(t(X)%\*%X)

\*\*Estamator variance6\*6

m54\_cd=lm(log(VALUEADD)~log(LABOR)+log(CAPITAL))

summary(m54\_cd)

X\_cd=cbind(1,log(LABOR),log(CAPITAL))

M\_cd=diag(N)-X\_cd%\*%solve(t(X\_cd)%\*%X\_cd)%\*%t(X\_cd)

e\_cd=M\_cd%\*%Y

ee\_cd=t(e\_cd)%\*%e\_cd

R2\_cd=1-t(e\_cd)%\*%e\_cd/t(Y)%\*%M0%\*%Y

s2\_cd=ee\_cd/(N-3)

est.var\_cd=s2\_cd[1,1]\*solve(t(X\_cd)%\*%X\_cd)

F=(R2-R2\_cd)/3/((1-R2)/(N-6))

F=(ee\_cd-ee)/3/(ee/(N-6))

1-pf(F,3,N-6)

qf(0.95,3,N-6)

f1=function(a){

a[2]+a[3]

}

b=coef(m54\_cd)

q=1

R=jacobian(f1,b)

F=t(R%\*%b-q)%\*%solve(R%\*%est.var\_cd%\*%t(R))%\*%(R%\*%b-q)/1

qf(0.95,1,N-3)

1-pf(F,1,N-3)

t2=(b[2]+b[3]-1)^2/(est.var\_cd[2,2]+est.var\_cd[3,3]+2\*est.var\_cd[2,3])

f2=function(a){

a[4]+a[5]+2\*a[6]

}

b=coef(m54)

q=matrix(c(1,0),2,1)

R=rbind(jacobian(f1,b),jacobian(f2,b))

F=t(R%\*%b-q)%\*%solve(R%\*%est.var%\*%t(R))%\*%(R%\*%b-q)/2

qf(0.95,2,N-6)

###########5.6

dat56=read.table("TableF5-2.csv",header=T,sep=",")

attach(dat56)

t=nrow(dat56)

m56=lm(log(REALCONS[2:t])~log(REALDPI[2:t])+log(REALCONS[1:(t-1)]),data=dat56)

summary(m56)

X=cbind(1,log(REALDPI[2:t]),log(REALCONS[1:(t-1)]))

Y=log(REALCONS[2:t])

M=diag(t-1)-X%\*%solve(t(X)%\*%X)%\*%t(X)

#####-1:jiejvxiang redi maker

e=M%\*%Y

resi=residuals(m56)

s2=t(e)%\*%e/(t-4)

s2=s2[1,1]

s22=t(resi)%\*%resi/(t-3)

est.var=s2\*solve(t(X)%\*%X)

sqrt(diag(est.var))

#####biaozhunwu-gb-fangcha

b=coef(m56)

d=function(b){

b[2]/(1-b[3])}

g=jacobian(d,b) \*\*\*yakebijvz1daoshu

sd=sqrt(g%\*%est.var%\*%t(g))#0.0002585,why?Fangchajisuan daoshu\*fangcha

((coef(m56)[2]/(1-coef(m56)[3]))-1)/sd#<1.96notrejected.

###########6.2

dat2=read.table("TableF4-1.csv",header=T,sep=",")

attach(dat2)

surface=HEIGHT\*WIDTH

aspect=HEIGHT/WIDTH

X=cbind(1,log(surface),aspect,SIGNED)

Y=log(PRICE)

m1=lm(Y~X-1)

summary(m1)

smearing=mean(exp(residuals(m1)))

Exp\_price=exp(fitted.values(m1))\*smearing

###########6.3

datpca=read.table("TableF4-3.csv",header=T,sep=",")

attach(datpca)

other=1-ACTION-ANIMATED-COMEDY-HORROR

X=cbind(1,ACTION,ANIMATED,COMEDY,HORROR,other,I(MPRATING==1),

I(MPRATING==2),I(MPRATING==3),log(BUDGET),SEQUEL,STARPOWR)

solve(t(X)%\*%X)

\*\*\*\*error：Xcan not solve r(12\*12)=11

buzz1=log(ADDICT)

buzz2=log(CMNGSOON)

buzz3=log(FANDANGO)

buzz4=CNTWAIT3

N=nrow(datpca)

M0=diag(N)-1/N

buzz=cbind(buzz1,buzz2,buzz3,buzz4)

Z=apply(M0%\*%buzz,2,function(x)x/(sd(x)))

V=1/(N-1)\*t(Z)%\*%Z#why??

C=eigen(V)

sum(eigen(V)$values/4)

cor(eigen(V)$vectors)

c1=C$vectors[,1]

c2=C$vectors[,2]

Zc1=Z%\*%c1

Zc2=Z%\*%c2

m2=lm(log(BOX)~ACTION+COMEDY+ANIMATED+HORROR+I(MPRATING==1)+

I(MPRATING==2)+I(MPRATING==3)+log(BUDGET)+SEQUEL+STARPOWR+Zc1)

summary(m2)

exp(coef(m2)[2])-1

###########6.4

library(dplyr)

dat64=read.table("TableF6-1.csv",header=T,sep=",")

attach(dat64)

m1=lm(log(C)~log(Q)+log(Q)^2+log(PF)+LF+T+I,data=dat64)

summary(m1)

nT=length(unique(T))

nI=length(unique(I))

T\_matrix=rbind(diag(nT-1),0)

T\_variable=T\_matrix[rep(1:nT,nI),]

I\_variable=matrix(0,nrow(dat64),nI-1)

Temp=1

for(iin1:(nI-1)){

I\_variable[Temp:(Temp+nT-1),i]=i

Temp=Temp+nT

}

Y=log(dat64$C)

m\_full=lm(log(C)~log(Q)+I(log(Q)^2)+log(PF)+LF+T\_variable+I\_variable,data=dat64)

summary(m\_full)

b=coef(m\_full)

X=cbind(1,log(Q),log(Q)^2,log(PF),LF,T\_variable,I\_variable)

M=diag(nrow(dat64))-X%\*%solve(t(X)%\*%X)%\*%t(X)

e=M%\*%Y

t(e)%\*%e

K=ncol(X)

s2=t(e)%\*%e/(nrow(dat64)-K)

s2=s2[1,1]

m\_timeonly=lm(log(C)~log(Q)+I(log(Q)^2)+log(PF)+LF+T\_variable,data=dat64)

summary(m\_timeonly)

X\_timeonly=cbind(1,log(Q),log(Q)^2,log(PF),LF,T\_variable)

M=diag(nrow(dat64))-X\_timeonly%\*%solve(t(X\_timeonly)%\*%X\_timeonly)%\*%t(X\_timeonly)

e\_timeonly=M%\*%Y

t(e\_timeonly)%\*%e\_timeonly

F=((t(e\_timeonly)%\*%e\_timeonly-t(e)%\*%e)/5)/(t(e)%\*%e/(nrow(dat64)-K))

qf(0.95,5,nrow(dat64)-K)

1-pf(F,5,nrow(dat64)-K)

R=cbind(matrix(0,5,K-5),diag(5))

q=matrix(rep(0,5),5,1)

wald=t(R%\*%b-q)%\*%solve(R%\*%solve(t(X)%\*%X)%\*%t(R))%\*%(R%\*%b-q)/(s2)

wald/F

m\_firmonly=lm(log(C)~log(Q)+I(log(Q)^2)+log(PF)+LF+I\_variable,data=dat64)

summary(m\_firmonly)

X\_firmonly=cbind(1,log(Q),log(Q)^2,log(PF),LF,I\_variable)

M=diag(nrow(dat64))-X\_firmonly%\*%solve(t(X\_firmonly)%\*%X\_firmonly)%\*%t(X\_firmonly)

e\_firmonly=M%\*%Y

t(e\_firmonly)%\*%e\_firmonly

F=((t(e\_firmonly)%\*%e\_firmonly-t(e)%\*%e)/14)/(t(e)%\*%e/(nrow(dat64)-K))

qf(0.95,14,nrow(dat64)-K)

1-pf(F,14,nrow(dat64)-K)

m\_no=lm(log(C)~log(Q)+I(log(Q)^2)+log(PF)+LF,data=dat64)

summary(m\_no)

X\_no=cbind(1,log(Q),log(Q)^2,log(PF),LF)

ncol(X)

M=diag(nrow(dat64))-X\_no%\*%solve(t(X\_no)%\*%X\_no)%\*%t(X\_no)

e\_no=M%\*%Y

t(e\_no)%\*%e\_no

F=((t(e\_no)%\*%e\_no-t(e)%\*%e)/19)/(t(e)%\*%e/(nrow(dat64)-K))

qf(0.95,19,nrow(dat64)-K)

1-pf(F,19,nrow(dat64)-K)

###########6.7

rm(list=ls(all=TRUE))

datfc=read.table("TableFC-1.csv",header=T,sep=",")

attach(datfc)

gamma\_den=function(a){

beta=a[1]

rho=a[2]

den=(beta+x)^(-rho)/gamma(rho)\*y^(rho-1)\*exp(-y/(beta+x))

logL=log(den)

return(sum(logL))

}

x=E

y=Y

n=NROW(datfc)

MLE=maxLik(gamma\_den,start=c(1,1),method="BFGS")

summary(MLE)

m=lm(Y~E)

summary(m)

f=function(a){

beta=a[1]/a[2]

return(beta)

}

res=residuals(m)

s2=t(res)%\*%res/(n-2)

s2=s2[1,1]

X=cbind(1,E)

est.var=solve(t(X)%\*%X)\*s2

g=jacobian(f,coef(m))

delta=g%\*%est.var%\*%t(g)

###########6.9

dat=read.table("TableF2-2.csv",header=T,sep=",")

attach(dat)

t=NROW(dat)

G=1000000\*GASEXP/(POP)

model=lm(log(G)~log(INCOME)+log(GASP)+log(PNC)+log(PUC)+I(YEAR-1952),data=dat)

summary(model)

res=residuals(model)

ee=t(res)%\*%res

pre=I(YEAR<1974)

post=I(YEAR>1973)

model1=lm(log(G)~log(INCOME)+log(GASP)+log(PNC)+log(PUC)+I(YEAR-1952),data=dat,subset=YEAR<1974)

summary(model1)

res1=residuals(model1)

ee1=t(res1)%\*%res1

model2=lm(log(G)~log(INCOME)+log(GASP)+log(PNC)+log(PUC)+I(YEAR-1952),data=dat,subset=YEAR>1973)

summary(model2)

res2=residuals(model2)

ee2=t(res2)%\*%res2

F1=(ee-ee1-ee2)/6/((ee1+ee2)/(t-2\*6))

qf(0.95,6,t-2\*6)

model3=lm(log(G)~log(INCOME)+log(GASP)+log(PNC)+log(PUC)+I(YEAR-1952)+I(YEAR==1974)+I(YEAR==1975)+I(YEAR==1980)+I(YEAR==1981),data=dat)

res3=residuals(model3)

ee3=t(res3)%\*%res3

F2=(ee-ee3)/4/(ee3/(t-6-4))#why

model4=lm(log(G)~log(INCOME)+log(GASP)+log(PNC)+log(PUC)+I(YEAR-1952)+I(YEAR>1973)+I(YEAR<1974)-1,data=dat)

res4=residuals(model4)

ee4=t(res4)%\*%res4

F3=(ee4-ee1-ee2)/5/((ee1+ee2)/(t-2\*6))

model5=lm(log(G)~log(INCOME)\*pre+log(GASP)\*pre+log(PNC)+log(PUC)+I(YEAR-1952),data=dat)

res5=residuals(model5)

ee5=t(res5)%\*%res5

F3=(ee5-ee1-ee2)/3/((ee1+ee2)/(t-2\*6))

s2=ee/(t-6)

s2=s2[1,1]

X=cbind(1,log(INCOME),log(GASP),log(PNC),log(PUC),I(YEAR-1952))

est.var=solve(t(X)%\*%X)\*s2

sd=sqrt(diag(est.var))

f1=function(b){

b[2]/(1-b[6])

}

f2=function(b){

b[3]/(1-b[6])

}

g2=jacobian(f1,coef(model))

g3=jacobian(f2,coef(model))

delta1=g2%\*%est.var%\*%t(g2)

delta2=g3%\*%est.var%\*%t(g3)

library(MASS)

#########Endogeneity######

n=1000

####cor(x1x2)=0.2,cor(x2,Z)=0.5

rho12=0.2

rho2z=0.5

Sigma=matrix(c(1,rho12,0,0,rho12,1,0,rho2z,0,0,1,0,0,rho2z,0,1),4,4)

X=mvrnorm(n,rep(0,4),Sigma)

Z=X[,4]

X=X[,-4]

beta=c(2,-1,0.9)

Y1=X%\*%beta+rnorm(n)

lm1=lm(Y1~X-1)

summary(lm1)\*\*123douhuigui

lm2=lm(Y1~X[,-1]-1)

summary(lm2)\*\*zhidui23\*\*youpian,neishengx

lm3=lm(Y1~X[,-3]-1)

summary(lm3)\*\*zhidui12

####################2SLS

sls1=lm(X[,2]~Z-1)

summary(sls1)

X2hat=predict(sls1)

lm2sls=lm(Y1~X2hat+X[,3]-1)

summary(lm2sls)

#######8.5

dat81=read.table("TableF8-1.csv",header=T,sep=",")

library(MASS)

library(Matrix)

attach(dat81)

N=nrow(dat81)

m0=lm(LWAGE~EXP+I(EXP^2)+WKS+OCC+IND+SOUTH+SMSA+MS+UNION+ED+FEM+BLK)

summary(m0)

m1=lm(WKS~LWAGE+ED+UNION+FEM)

summary(m1)

bls=coef(m1)

m01=lm(LWAGE~IND+ED+UNION+FEM)

m11=lm(WKS~predict(m01)+ED+UNION+FEM)

summary(m11)

Z=cbind(1,IND,ED,UNION,FEM)

X=cbind(1,LWAGE,ED,UNION,FEM)

KX=ncol(X)

KZ=ncol(Z)

X\_hat=cbind(1,Z%\*%solve(t(Z)%\*%Z)%\*%t(Z)%\*%LWAGE,ED,UNION,FEM)

biv=solve(t(X\_hat)%\*%X\_hat)%\*%t(X\_hat)%\*%WKS

solve(t(Z)%\*%X)%\*%t(Z)%\*%WKS

eiv=WKS-X%\*%biv

s2iv=t(eiv)%\*%eiv/(N-KZ)

asy.var.iv=s2iv[1,1]\*solve(t(X)%\*%Z%\*%solve(t(Z)%\*%Z)%\*%t(Z)%\*%X)

sqrt(diag(asy.var.iv))

iv=ivreg(WKS~LWAGE+ED+UNION+FEM|IND+ED+UNION+FEM)

summary(iv)

########Hausman###########

Mls=diag(N)-X%\*%solve(t(X)%\*%X)%\*%t(X)

Miv=diag(N)-X\_hat%\*%solve(t(X\_hat)%\*%X\_hat)%\*%t(X\_hat)

els=Mls%\*%WKS

eiv=Miv%\*%WKS

s2ls=t(els)%\*%els/(N-KX)

s2iv=t(eiv)%\*%eiv/(N-KZ)

asy.var.ls=s2ls[1,1]\*solve(t(X)%\*%X)

asy.var.iv=s2iv[1,1]\*solve(t(Z)%\*%X)%\*%(t(Z)%\*%Z)%\*%solve(t(X)%\*%Z)

asy.var.iv=s2iv[1,1]\*solve(t(X\_hat)%\*%X\_hat)

H=t(biv-bls)%\*%solve(asy.var.iv-asy.var.ls)%\*%(biv-bls)

m=solve(t(X\_hat)%\*%X\_hat)-solve(t(X)%\*%X)

rankMatrix(m)

H=(t(biv-bls)%\*%ginv(m)%\*%(biv-bls))/s2ls

qchisq(0.95,1)

\*\*\*\*Xiugai\*\*\*\*x\_hat

#########Wutest#####8.6Wutest

m12=lm(WKS~LWAGE+ED+UNION+FEM+I(Z%\*%solve(t(Z)%\*%Z)%\*%t(Z)%\*%LWAGE))

summary(m12)

####################8.7

dat87=read.table("TableF5-2.csv",header=T,sep=",")

attach(dat87)

N=nrow(dat87)

X=cbind(1,REALDPI[-1])

Y=REALCONS[-1]

Z=cbind(1,REALCONS[1:(N-1)],REALDPI[1:(N-1)])

m0=lm(REALCONS[-1]~REALDPI[-1])

summary(m0)

m01=lm(REALDPI[-1]~REALCONS[1:(N-1)]+REALDPI[1:(N-1)])

summary(m01)

m11=lm(REALCONS[-1]~predict(m01))

summary(m11)

m12=lm(REALCONS[-1]~REALDPI[-1]+predict(m01))

summary(m12)

X\_hat=cbind(1,Z%\*%solve(t(Z)%\*%Z)%\*%t(Z)%\*%REALDPI[-1])

bls=solve(t(X)%\*%X)%\*%t(X)%\*%Y

biv=solve(t(X\_hat)%\*%X\_hat)%\*%t(X\_hat)%\*%Y

Mls=diag(N-1)-X%\*%solve(t(X)%\*%X)%\*%t(X)

Miv=diag(N-1)-X\_hat%\*%solve(t(X\_hat)%\*%X\_hat)%\*%t(X\_hat)

els=Mls%\*%Y

eiv=Miv%\*%Y

s2ls=t(els)%\*%els/(N-1-2)

s2iv=t(eiv)%\*%eiv/(N-1-2)

asy.var.ls=s2ls[1,1]\*solve(t(X)%\*%X)

asy.var.iv=s2iv[1,1]\*solve(t(X)%\*%Z%\*%solve(t(Z)%\*%Z)%\*%t(Z)%\*%X)

#asy.var.iv=s2iv[1,1]\*solve(t(X\_hat)%\*%X\_hat)

H=t(biv-bls)%\*%solve(asy.var.iv-asy.var.ls)%\*%(biv-bls)

m=solve(t(X\_hat)%\*%X\_hat)-solve(t(X)%\*%X)

H=(t(biv-bls)%\*%ginv(m)%\*%(biv-bls))/s2ls

qchisq(0.95,1)

###

eiv=Y-X%\*%biv

s2iv=t(eiv)%\*%eiv/(N-1-2)

asy.var.ls=s2ls[1,1]\*solve(t(X)%\*%X)

asy.var.iv=s2iv[1,1]\*solve(t(X)%\*%Z%\*%solve(t(Z)%\*%Z)%\*%t(Z)%\*%X)

H=t(biv-bls)%\*%solve(asy.var.iv-asy.var.ls)%\*%(biv-bls)

####################8.8

dat81=read.table("TableF8-1.csv",header=T,sep=",")

attach(dat81)

N=nrow(dat81)

m0=lm(LWAGE~EXP+I(EXP^2)+WKS+OCC+IND+SOUTH+SMSA+MS+UNION+ED+FEM+BLK)

summary(m0)

m1=lm(WKS~LWAGE+ED+UNION+FEM)

summary(m1)

bls=coef(m1)

m01=lm(LWAGE~IND+ED+UNION+FEM+SMSA)

m11=lm(WKS~predict(m01)+ED+UNION+FEM)

summary(m11)###the length of variance is difference

###can not reg

Z=cbind(1,IND,ED,UNION,FEM,SMSA)

X=cbind(1,LWAGE,ED,UNION,FEM)

KX=ncol(X)

KZ=ncol(Z)

X\_hat=cbind(1,Z%\*%solve(t(Z)%\*%Z)%\*%t(Z)%\*%LWAGE,ED,UNION,FEM)

bls=solve(t(X)%\*%X)%\*%t(X)%\*%WKS

biv=solve(t(X\_hat)%\*%X\_hat)%\*%t(X\_hat)%\*%WKS

Mls=diag(N)-X%\*%solve(t(X)%\*%X)%\*%t(X)

els=Mls%\*%WKS

eiv=WKS-X%\*%biv

s2ls=t(els)%\*%els/(N)

s2iv=t(eiv)%\*%eiv/(N)

est.var.iv=s2iv[1,1]\*solve(t(X)%\*%Z%\*%solve(t(Z)%\*%Z)%\*%t(Z)%\*%X)

sqrt(diag(est.var.iv))

m=t(Z)%\*%eiv/N

W=t(m)%\*%solve(s2iv[1,1]/N^2\*t(Z)%\*%Z)%\*%m

W=t(m)%\*%solve(s2ls[1,1]/N^2\*t(Z)%\*%Z)%\*%m

##9-2

(0.2436-0.06393)/2/((1-0.2436)/(N-5))#frac{(r2-r2\*)/J}{(1-r2)/(n-k)}

qf(0.99,2,N-5)

f1=function(b)b[4]

f2=function(b)b[5]

q=matrix(c(0,0),2,1)

R=rbind(jacobian(f1,b),jacobian(f2,b))

wald=t(R%\*%b-q)%\*%solve(R%\*%est.var.white%\*%t(R))%\*%(R%\*%b-q)

qchisq(0.95,2)

1-pchisq(wald,3)

############9.3#white

income2=INCOME^2

income2=income2[AVGEXP>0]

age=AGE[AVGEXP>0]

income=INCOME[AVGEXP>0]

own=OWNRENT[AVGEXP>0]

m2=lm(resi^2~age+own+income+income2+I(age^2)+I(age\*own)+I(age\*income)

+I(age\*income2)+I(own\*income)+I(own\*income2)+I(income\*income2)+I(income2^2))

summary(m2)

white=N\*0.199

1-pchisq(0.95,12)

qchisq(0.95,12)

#BP

ssr=t(resi)%\*%resi

gi=resi^2/(ssr[1,1]/72)-1

Z=cbind(1,income,income2)

LM=0.5\*t(gi)%\*%Z%\*%solve(t(Z)%\*%Z)%\*%t(Z)%\*%gi

qchisq(0.95,2)

############9.4

dat64=read.table("TableF6-1.csv",header=T,sep=",")

attach(dat64)

N=nrow(dat64)

nT=length(unique(T))

nI=length(unique(I))

T\_matrix=rbind(diag(nT-1),0)

T\_variable=T\_matrix[rep(1:nT,nI),]

I\_variable=matrix(0,nrow(dat64),nI-1)

Temp=1

for(iin1:(nI-1)){

I\_variable[Temp:(Temp+nT-1),i]=i

Temp=Temp+nT

}

Y=log(dat64$C)

m\_full=lm(log(C)~log(Q)+I(log(Q)^2)+log(PF),data=dat64)

summary(m\_full)

###howtocalculatewhite.asy.var?

b=coef(m\_full)

X=cbind(1,log(Q),log(Q)^2,log(PF))

M=diag(nrow(dat64))-X%\*%solve(t(X)%\*%X)%\*%t(X)

e=M%\*%Y#residual(m\_full)

ssr=t(e)%\*%e

gi=e^2/(ssr[1,1]/90)-1

Z=cbind(1,LF)

LM=0.5\*t(gi)%\*%Z%\*%solve(t(Z)%\*%Z)%\*%t(Z)%\*%gi

qchisq(0.95,1)

m2=lm(log(e^2)~LF)

summary(m2)

w=exp(-coef(m2)[1]-coef(m2)[2]\*LF)#weight=1/exp(xxx)

m\_full=lm(log(C)~log(Q)+I(log(Q)^2)+log(PF),data=dat64,weight=w)#WLS

summary(m\_full)

omega=diag(exp(fitted.values(m2)))

bgls=solve(t(X)%\*%solve(omega)%\*%X)%\*%t(X)%\*%solve(omega)%\*%log(C)

P=chol(solve(omega))

Xstar=P%\*%X

M=diag(N)-Xstar%\*%solve(t(Xstar)%\*%Xstar)%\*%t(Xstar)

Ystar=P%\*%log(C)

e\_star=Ystar-Xstar%\*%bgls

s\_star=t(e\_star)%\*%e\_star/(N-4)

sd\_gls=sqrt(diag(s\_star[1,1]\*solve(t(X)%\*%solve(omega)%\*%X)))

m3=lm(Ystar~Xstar-1)

summary(m3)

####11.1

dat81=read.table("TableF8-1.csv",header=T,sep=",")

attach(dat81)

m1=lm(LWAGE~EXP+I(EXP^2)+WKS+OCC+IND+SOUTH+SMSA+MS+UNION+ED+FEM+BLK)

summary(m1)\*\*\*\*4152

N=NROW(dat81)\*4165

T=7

Ni=NROW(dat81)/T

X=cbind(1,EXP,I(EXP^2),WKS,OCC,IND,SOUTH,SMSA,MS,UNION,ED,FEM,BLK)

K=NCOL(X)\*13

resi=residuals(m1)

s0\_white=matrix(0,K,K)\*\*13×13

for(i in 1:N){

temp=resi[i]^2\*(X[i,]%\*%(t(X[i,])))

s0\_white=s0\_white+temp

}

S0\_white=s0\_white/(N)

est.var.white=N\*solve(t(X)%\*%X)%\*%S0\_white%\*%solve(t(X)%\*%X)

sqrt(diag(est.var.white))

s0\_robust=matrix(0,K,K)\*\*13×13

XX=matrix(0,K,K)

ind=1

for(iin1:Ni){

xe=colSums(resi[ind:(ind+T-1)]\*X[ind:(ind+T-1),])

temp1=xe%\*%t(xe)

s0\_robust=s0\_robust+temp1

temp2=t(X[ind:(ind+T-1),])%\*%X[ind:(ind+T-1),]

XX=XX+temp2

ind=ind+T

}

est.var.robust=solve(XX)%\*%s0\_robust%\*%solve(XX)

#est.var.robust=solve(t(X)%\*%X)%\*%s0\_robust%\*%solve(t(X)%\*%X)

sqrt(diag(est.var.robust))

##########11.2

dat41=read.table("TableF4-1.csv",header=T,sep=",")

attach(dat41)

N=NROW(dat41)

surface=HEIGHT\*WIDTH

aspect=HEIGHT/WIDTH

m1=lm(log(PRICE)~log(surface)+SIGNED+log(aspect))

summary(m1)

resi=residuals(m1)

G=length(unique(PICTURE))

X=cbind(1,log(surface),SIGNED,log(aspect))

K=NCOL(X)\*4

s0\_robust=matrix(0,K,K)

ind=1

for(iin1:G){

ng=length(PICTURE[PICTURE==i])

if(ng==1){

xe=resi[ind:(ind+ng-1)]\*X[ind:(ind+ng-1),]

}elsexe=colSums(resi[ind:(ind+ng-1)]\*X[ind:(ind+ng-1),])

temp1=xe%\*%t(xe)

s0\_robust=s0\_robust+temp1

ind=ind+ng

}

est.var.robust=solve(t(X)%\*%X)%\*%((G/(G-1))\*s0\_robust)%\*%solve(t(X)%\*%X)

sqrt(diag(est.var.robust))

?????why?????

s0\_robust=matrix(0,K,K)

XX=matrix(0,K,K)

ind=1

for(iin1:G){

ng=length(PICTURE[unique(PICTURE)[i]])

if(ng==1){

xe=resi[ind:(ind+ng-1)]\*X[ind:(ind+ng-1),]

}elsexe=colSums(resi[ind:(ind+ng-1)]\*X[ind:(ind+ng-1),])

temp1=xe%\*%t(xe)

s0\_robust=s0\_robust+temp1

X\_temp=as.matrix(X[ind:(ind+ng-1),])

temp2=X\_temp%\*%t(X\_temp)

XX=XX+temp2

ind=ind+ng

}

est.var.robust=solve(XX)%\*%((G/(G-1))\*s0\_robust)%\*%solve(XX)

sqrt(diag(est.var.robust))

##################11.5

dat81=read.table("TableF8-1.csv",header=T,sep=",")

attach(dat81)

m1=lm(LWAGE~EXP+I(EXP^2)+WKS+OCC+IND+SOUTH+SMSA+MS+UNION)

summary(m1)

resi0=residuals(m1)

N=NROW(dat81)

T=7

Ni=NROW(dat81)/T

X=cbind(EXP,I(EXP^2),WKS,OCC,IND,SOUTH,SMSA,MS,UNION)

X1=cbind(1,X)

Z=cbind(1,ED,FEM,BLK)

K=NCOL(X)

s0\_white=matrix(0,K,K)

for(iin1:N){

temp=resi0[i]^2\*(X[i,]%\*%(t(X[i,])))

s0\_white=s0\_white+temp

}

I\_variable=matrix(0,nrow(dat81),Ni)

Temp=1

for(iin1:(Ni)){

I\_variable[Temp:(Temp+T-1),i]=1

Temp=Temp+T

}

#I\_variable=I\_variable[,-1]

m2=lm(LWAGE~EXP+I(EXP^2)+WKS+OCC+IND+SOUTH+SMSA+MS+UNION+I\_variable)

summary(m2)

D=I\_variable

MD=diag(N)-D%\*%solve(t(D)%\*%D)%\*%t(D)

b\_within=solve(t(X)%\*%MD%\*%X)%\*%t(X)%\*%MD%\*%LWAGE

ee=t(MD%\*%LWAGE-MD%\*%X%\*%b\_within)%\*%(MD%\*%LWAGE-MD%\*%X%\*%b\_within)

s2=ee/(N-K-ncol(D))

est.var=s2[1,1]\*solve(t(X)%\*%MD%\*%X)

sd=sqrt(diag(est.var))

#####11.11\_fixed

s0\_robust=matrix(0,K,K)

Xd=MD%\*%XolSums(resi[ind:(ind+T-1)]\*Xd[ind:(ind+T-1),]

resi=MD%\*%LWAGE-MD%\*%X%\*%b\_within

XX=matrix(0,K,K)

ind=1

for(iin1:Ni){

xe=c)

temp1=xe%\*%t(xe)

s0\_robust=s0\_robust+temp1

temp2=t(Xd[ind:(ind+T-1),])%\*%Xd[ind:(ind+T-1),]

XX=XX+temp2

ind=ind+T

}

#est.var.robust=solve(XX)%\*%s0\_robust%\*%solve(XX)##need corrections!see footnote

est.var.robust=solve(XX)%\*%((N-1)\*Ni/((Ni-1)\*(N-K-Ni))\*s0\_robust)%\*%solve(XX)

sqrt(diag(est.var.robust))

#####

a=solve(t(D)%\*%D)%\*%t(D)%\*%(LWAGE-X%\*%b\_within)

alpha=rep(a,each=T)

m3=lm(alpha~Z-1)

summary(m3)

m4=lm(a~Z[seq(1,4159,7),]-1)

summary(m4)

hn=residuals(m4)

h=D%\*%hn

m5=lm(LWAGE~X+Z[,-1]+h)

summary(m5)

###########11.6

m6=lm(LWAGE~X)

summary(m6)

e2=residuals(m6)

s22=t(e2)%\*%e2/(N-K-1)

sigu2=s22-s2

i=matrix(1,T,1)

theta=1-sqrt(s2[1,1])/sqrt(s2[1,1]+T\*sigu2[1,1])

SIGMA=s2[1,1]\*diag(T)+sigu2[1,1]\*i%\*%t(i)

SIGMA\_inv=solve(SIGMA)

OMEGA\_INV=diag(Ni)%x%SIGMA\_inv

bgls=solve(t(X1)%\*%OMEGA\_INV%\*%X1)%\*%t(X1)%\*%OMEGA\_INV%\*%LWAGE

#ev=eigen(SIGMA)

#tt=t(ev$vec%\*%diag(ev$val^(-0.5))%\*%t(ev$vec))

#t(tt)%\*%tt

P=chol(OMEGA\_INV)

Xstar=P%\*%X1

M=diag(N)-Xstar%\*%solve(t(Xstar)%\*%Xstar)%\*%t(Xstar)

Ystar=P%\*%LWAGE

e\_star=Ystar-Xstar%\*%bgls

s\_star=t(e\_star)%\*%e\_star/(N-K-1)

sd\_gls=sqrt(diag(s\_star[1,1]\*solve(t(X1)%\*%OMEGA\_INV%\*%X1)))

m7=lm(Ystar~Xstar-1)

summary(m7)

resip=residuals(m7)

############9-33/11.11

s0\_robust2=matrix(0,K+1,K+1)

XX=matrix(0,K+1,K+1)

ind=1

for(iin1:Ni){

xe=colSums(resip[ind:(ind+T-1)]\*Xstar[ind:(ind+T-1),])

temp1=xe%\*%t(xe)

s0\_robust2=s0\_robust2+temp1

temp2=t(Xstar[ind:(ind+T-1),])%\*%Xstar[ind:(ind+T-1),]

XX=XX+temp2

ind=ind+T

}

est.var.robust2=solve(XX)%\*%s0\_robust2%\*%solve(XX)

sqrt(diag(est.var.robust2))

############################

ev=eigen(SIGMA)

P2=t(ev$vec%\*%diag(ev$val^(-0.5))%\*%t(ev$vec))

P2=diag(Ni)%x%P2

(P2%\*%X1)[1,]

Xtheta=(X1+theta\*(MD%\*%X1-X1))#/sqrt(s2[1,1])

Ytheta=(LWAGE+theta\*(MD%\*%LWAGE-LWAGE))#/sqrt(s2[1,1])

mm1=lm(Ytheta~Xtheta-1)

r1=residuals(mm1)

s0\_robust2=matrix(0,K+1,K+1)

XX=matrix(0,K+1,K+1)

ind=1

for(iin1:Ni){

xe=colSums(r1[ind:(ind+T-1)]\*Xtheta[ind:(ind+T-1),])

temp1=xe%\*%t(xe)

s0\_robust2=s0\_robust2+temp1

temp2=t(Xtheta[ind:(ind+T-1),])%\*%Xtheta[ind:(ind+T-1),]

XX=XX+temp2

ind=ind+T

}

est.var.robust2=solve(XX)%\*%s0\_robust2%\*%solve(XX)

sqrt(diag(est.var.robust2))

##

e2\_bar=rep(0,Ni)

ind=1

for(iin1:Ni){

temp=e2[ind:(ind+T-1)]

e2\_bar[i]=mean(temp)

ind=ind+T

}

Te2=sum((T\*e2\_bar)^2)

LM=N/(2\*T-1)\*(Te2/t(e2)%\*%e2-1)^2

################

install.packages("plm")

library(plm)

ID=rep(seq(1,Ni,1,),each=T)

YEAR=rep(seq(1,7,1),Ni)

dat81$ID=ID

dat81$YEAR=YEAR

m8=plm(LWAGE~EXP+I(EXP^2)+WKS+OCC+IND+SOUTH+SMSA+MS+UNION,data=dat81,

index=c("ID","YEAR"),effect="individual",model="pooling")

summary(m8)

############11.8

H=t(b\_within-bgls[-1])%\*%solve(est.var-vcov(m7)[-1,-1])%\*%(b\_within-bgls[-1])\*\*\*hausman

qchisq(0.95,9)

\*pi

n=10000000

r=1

x=runif(n,-1,1)

y=runif(n,-1,1)

ED=sqrt(x^2+y^2)

count=length(ED[ED<=1])#count/n=pi/4

pi\_estimate=count/n\*4

pi\_estimate