ECG 753 Microeconometrics Homework 6

Chowdhury Amir Abdullah

Question 1

Question 2

2a

```
%simulating 1000 times
clear;
close all;
rng(19);

N=1000 ;
beta2=zeros(N,1);

m = [0;0;0];
cov = [1 0 0;0 1 0;0 0 1];

parfor i=1:N
xstar = ones(N,2);
x= ones(N,2);
eta=zeros(N,1);
ystar = zeros(N,1);
for n=1:N
k = mvnrnd(m,cov);
xstar(n,2) = k(1,1);
%error_term= k(1,2);
eta(n,1)=k(1,3);
x(n,2)=eta(n,1)+xstar(n,2);
ystar(n,1) = xstar(n,2) + k(1,2)+1;
end
beta22 = inv(x'*x)*x'*ystar;
beta2(i,1)= beta22(2,1);
end

mean(beta2)
```

```
ans = 0.5000
```

2b

$\widehat{\beta}_1$ is 1.0012. This is close to the true value i.e. $\beta_1 = 1$.

Yes, IV has fixed the bias.

```matlab
clear;
close all;
rng(19);

N=1000 ;
beta3=zeros(1000,1);

m = [0;0;0;0];
cov = [1 0 0 0;0 1 0 0;0 0 1 0;0 0 0 1];

parfor i=1:1000
xstar = ones(N,2);
x= ones(N,2);
eta=zeros(N,1);
ystar = zeros(N,1);
z=ones(N,2);
v=zeros(N,1);
for n=1:N
k = mvnrnd(m,cov);
xstar(n,2) = k(1,1);
eta(n,1)=k(1,3);
v(n,1)=k(1,4);
z(n,2)=v(n,1)+xstar(n,2);
x(n,2)=eta(n,1)+xstar(n,2);
ystar(n,1) = xstar(n,2) + k(1,2)+1;
end
P=z*inv(z'*z)*z';
beta33 = inv(x'*P*x)*x'*P*ystar;
% homework 5 projection matrix
beta3(i,1)= beta33(2,1);
end
mean(beta3)
```

ans = 1.0012