

# 0227 code

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## ACE calculation function

```
re.est = function(as,mn,pb,df,obs,n){  
  
  fit = lm(cs~as+mn+pb+age+iq+as.factor(edu)+as.factor(smoke),data = df)  
  
  as.q = quantile(as,c(0.25,0.75))  
  mn.q = quantile(mn,c(0.25,0.75))  
  pb.q = quantile(pb,c(0.25,0.75))  
  
  as = rep(as.q[1],n)  
  mn = rep(mn.q[1],n)  
  pb = rep(pb.q[1],n)  
  new1 = data.frame(as,mn,pb,obs)  
  yhat_25 = predict(fit,new1,type = 'response')  
  
  as = rep(as.q[2],n)  
  mn = rep(mn.q[2],n)  
  pb = rep(pb.q[2],n)  
  new2 = data.frame(as,mn,pb,obs)  
  yhat_75 = predict(fit,new2,type = 'response')  
  
  ace = mean(yhat_75)-mean(yhat_25)  
  return(ace)  
}
```

## Simulation

```
n=825  
#simulation = 100  
nsim = 100  
est.holder = rep(NA,nsim)  
true.holder = rep(NA,nsim)  
for(i in 1:nsim){  
  #confoundings  
  age = rnorm(825,22.9,4.2)  
  iq = rnorm(825,26,5)  
  edu = rbinom(825,1,0.24)  
  smoke = rbinom(825,1,0.24)  
  
  obs = data.frame(age,iq,edu,smoke)  
  #a  
  as = age^(1/2)+age*iq+edu+smoke^2+rnorm(825,0,0.5)  
  mn = age*2+edu^2+iq+smoke^3+rnorm(825,0,0.5)  
  pb = age+iq*edu+iq*smoke+smoke^2+rnorm(825,0,0.5)
```

```

df = data.frame(as,mn,pb,obs)

#y
cs = 0.05*as+0.7*mn-0.023*pb+age*iq+edu*iq+smoke^2 +rnorm(n,sd = 0.23)

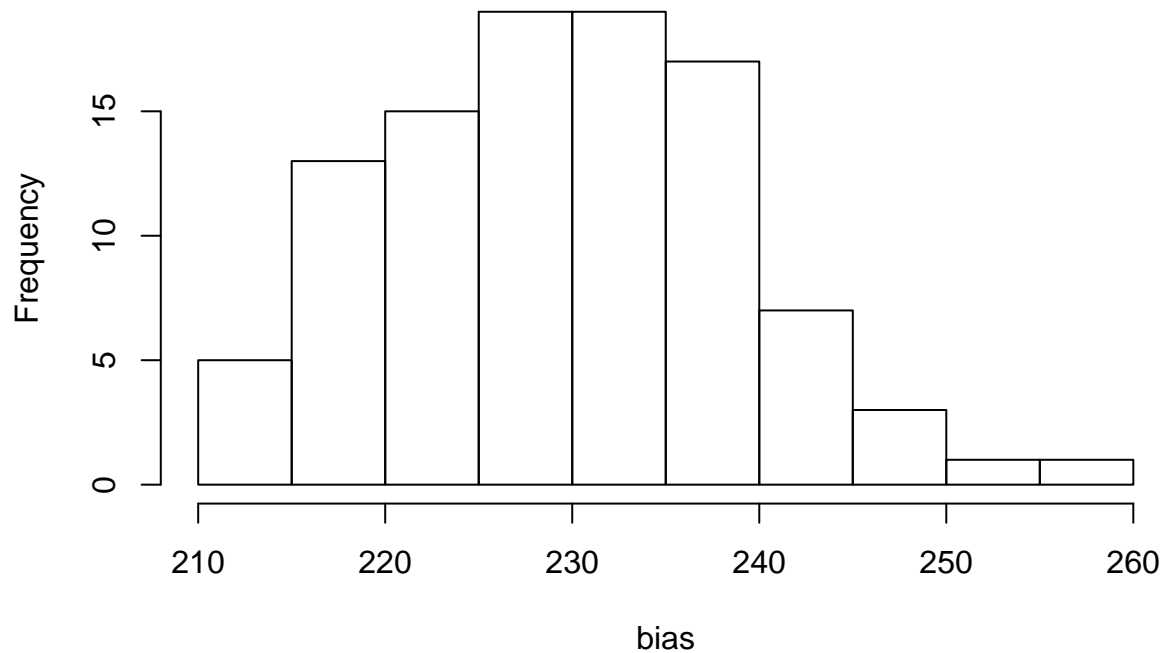
#true ace
true.holder[i] = 0.05*(quantile(as,0.75)-quantile(as,0.25))+0.7*(quantile(mn,0.75)-quantile(mn,0.25))-0

est.holder[i] = re.est(as,mn,pb,df = df,obs = obs,n = n)
}

bias = est.holder-true.holder
hist(bias)

```

**Histogram of bias**



## description

```

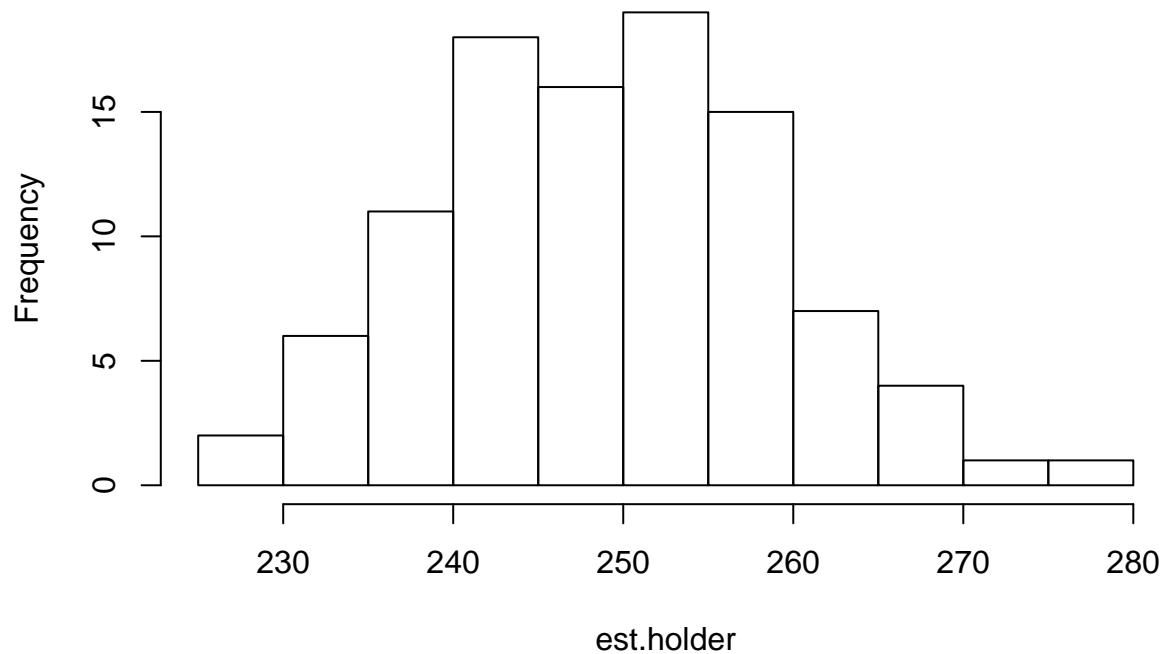
var(est.holder)

## [1] 99.28373
var(true.holder)

## [1] 0.5817807
hist(est.holder)

```

## Histogram of est.holder



## Bootstrap

```
boots = 100
b.holder = rep(NA)
for (i in 1:boots) {

  idx = sample(1:n,size = n, replace = TRUE)
  data.b = df[idx,]
  obs.b = obs[idx,]

  as.b = pull(data.b,as)
  mn.b = pull(data.b,mn)
  pb.b = pull(data.b,pb)

  quantile(as.b,0.25)

  b.holder[i] = re.est(as.b,mn.b,pb.b,df = data.b,obs = obs.b,n = n)
}

var(b.holder)

## [1] 35058.38
```