CH4 – C3

hprice1 <- read_excel("C:/Users/kaihu/Desktop/Quantitative Finance/Econometrics/Homework/Homework3/Dataset/hprice1.xls",

+ col_names = c("price","assess","bdrm","lotsize","sqrft","colonial","lprice","lassess","llotsize","lsqrft"))

View(hprice1)

reg <- lm(lprice~sqrft+bdrm,data=hprice1)

summary(reg)

```
Call:
lm(formula = lprice ~ sqrft + bdrm, data = hprice1)

Residuals:
     Min       1Q   Median       3Q      Max
-0.75448 -0.12322 -0.01993  0.11938  0.62948

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) 4.766e+00  9.704e-02  49.112  < 2e-16 ***
sqrft       3.794e-04  4.321e-05   8.781  1.5e-13 ***
bdrm        2.888e-02  2.964e-02   0.974    0.333
---
Signif. codes:  0 ?**?0.001 ?*?0.01 ??0.05 ??0.1 ??1

Residual standard error: 0.1971 on 85 degrees of freedom
Multiple R-squared:  0.5883,    Adjusted R-squared:  0.5786
F-statistic: 60.73 on 2 and 85 DF,  p-value: < 2.2e-16
```

factors <- hprice1$sqrft - 150 * hprice1$bdrm

reg1 <- lm(hprice1$lprice~factors + hprice1$bdrm)

summary(reg1)

```
Call:
lm(formula = hprice1$lprice ~ factors + hprice1$bdrm)

Residuals:
     Min       1Q   Median       3Q      Max
-0.75448 -0.12322 -0.01993  0.11938  0.62948

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  4.766e+00  9.704e-02  49.112  < 2e-16 ***
factors      3.794e-04  4.321e-05   8.781  1.5e-13 ***
hprice1$bdrm 8.580e-02  2.677e-02   3.205   0.0019 **
---
Signif. codes:  0 ?**?0.001 ?*?0.01 ??0.05 ??0.1 ??1

Residual standard error: 0.1971 on 85 degrees of freedom
Multiple R-squared:  0.5883,    Adjusted R-squared:  0.5786
F-statistic: 60.73 on 2 and 85 DF,  p-value: < 2.2e-16
```

confint(reg1)

```
                    2.5 %      97.5 %
(Intercept)  4.5730771120 4.958977961
factors      0.0002935289 0.000465363
hprice1$bdrm 0.0325803014 0.139022293
```

(i) $\beta_1 = 0.0003794$ $\beta_2 = 0.02888$

The estimator of θ is 0.08579

(ii) $\beta_2 = \theta - 150\beta_1$

So, the equation is $\log(\text{price}) = \beta_0 + \beta_1(sqrft - 150berms) + \theta berms + u$

(iii) The estimator of θ is 0.08580

The 95% confidence interval is [0.032580314, 0.139022293]

CH4 – C8

```
X401ksubs <- read_excel("C:/Users/kaihu/Desktop/Quantitative
Finance/Econometrics/Homework/Homework3/Dataset/401ksubs.xls",
                +    col_names =
c("e401k","inc","marr","male","age","fsize","nettfa","p401k","pira","incsq","agesq"))

> View(X401ksubs)

subset_fsize1 <- subset(X401ksubs,fsize == 1)

nrow(subset_fsize1)

[1] 2017

X401ksubs <- read_excel("C:/Users/kaihu/Desktop/Quantitative
Finance/Econometrics/Homework/Homework3/Dataset/401ksubs.xls",
                +    col_names =
c("e401k","inc","marr","male","age","fsize","nettfa","p401k","pira","incsq","agesq"))
```

```
> View(X401ksubs)

subset_fsize1 <- subset(X401ksubs,fsize == 1)

nrow(subset_fsize1)

reg <- lm(nettfa~inc+age,data = subset_fsize1)

summary(reg)

Call:
lm(formula = nettfa ~ inc + age, data = subset_fsize1)

Residuals:
    Min      1Q  Median      3Q     Max
-179.95  -14.16   -3.42    6.03 1113.94

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) -43.03981    4.08039 -10.548   <2e-16 ***
inc           0.79932    0.05973  13.382   <2e-16 ***
age           0.84266    0.09202   9.158   <2e-16 ***
---
Signif. codes:  0 ?**?0.001 ?*?0.01 ??0.05 ??0.1 ??1

Residual standard error: 44.68 on 2014 degrees of freedom
Multiple R-squared:  0.1193,    Adjusted R-squared:  0.1185
F-statistic: 136.5 on 2 and 2014 DF,  p-value: < 2.2e-16

z <- (0.84266 - 1)/0.09202

pt(z,2014)

[1] 0.04372422

reg1 <- lm(nettfa~inc,data = subset_fsize1)

summary(reg1)

Call:
lm(formula = nettfa ~ inc, data = subset_fsize1)

Residuals:
    Min      1Q  Median      3Q     Max
-185.12  -12.85   -4.85    1.78 1112.66

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) -10.5709     2.0607   -5.13 3.18e-07 ***
inc           0.8207     0.0609   13.48  < 2e-16 ***
---
Signif. codes:  0 ?**?0.001 ?*?0.01 ??0.05 ??0.1 ??1

Residual standard error: 45.59 on 2015 degrees of freedom
Multiple R-squared:  0.08267,   Adjusted R-squared:  0.08222
F-statistic: 181.6 on 1 and 2015 DF,  p-value: < 2.2e-16

summary(reg1)

z1 <- (0.8207 - 0.79932)/0.0609

pt(z,2014,lower.tail = FALSE)
```

```
> z1 <- (0.8207 - 0.79932)/0.0609
> z1
[1] 0.3510673
> pt(z,2014,lower.tail = FALSE)
[1] 0.9562758
>
```

(i) There are 2017 single-person households in the data set.

(ii) β_1 is 0.79932, which means income increases 1000 dollar, net total fin would increase 799.32 dollar in corresponding. β_2 is 0.84266 which means age increase 1 year, net total fin would increase 842.66 dollar in corresponding. There is nothing which makes us surprised.

(iii) The intercept means that a single people without any survey experiences and income would have negative net financial wealth.

(iv) Because p value is 0.4372422, thus cannot reject H0 at 1% level.

(v) β_1 is 0.8207. Do the hypothesis test, let ho: $\beta_1 = 0.79932$, $\beta_1 > 0.79932$. According to the test, the p-value is 0.04372422, thus they are significant different at 95% confidence level