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Coding Examples

1. **Confidence interval of wages and education with Correlation**

> wages<-c(30,20,20,40,40)

> education<-c(15,12,13,16,18)

> cor.test(wages,education)

Pearson's product-moment correlation

data: wages and education

t = 3.4641, df = 3, p-value = 0.04052

alternative hypothesis: true correlation is not equal to 0

95 percent confidence interval:

0.0576676 0.9930528

sample estimates:

cor

0.8944272

**2)** **Graph of Growth in per capita Income**

> percapita<-read.csv("Income Per Capita.csv",header=TRUE)

> capinc1929<-percapita$percapitainc1929

> growth<-percapita$Growth

> attach(percapita)

> plot(capinc1929,growth,main="Growth in Per Capita Income From 1929 to 2018",xlab="Per Capita Income in 1929",ylab="Growth Rate in Percent")

> abline(lm(growth~capinc1929))



**3)** **How schooling affects hourly earnings based on excel data.**

> earnings<-read.table("earnings2019.csv",header=TRUE,sep=",")

> ols1<-lm(l\_EARNINGS~FEMALE+ETHBLACK+ETHHISP+AGE+S+MARRIED+ASVAB01+ASVAB02+HEIGHT+WEIGHT+EXP+HOURS+TENURE,data=earnings)

> library(stargazer)

> stargazer(ols1,type="text",digits=6,title="Table 1: Hourly Earnings Per hour(in dollars)")

Table 1: Hourly Earnings Per hour(in dollars)

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Dependent variable:

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l\_EARNINGS

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FEMALE -0.212171\*\*\*

(0.063470)

ETHBLACK 0.033989

(0.089528)

ETHHISP 0.061157

(0.089079)

AGE -0.027424\*\*\*

(0.009916)

S 0.088849\*\*\*

(0.010677)

MARRIED -0.019925

(0.045557)

ASVAB01 0.005178

(0.003358)

ASVAB02 0.006974\*\*

(0.003255)

HEIGHT 0.015095\*

(0.008218)

WEIGHT -0.001824\*\*\*

(0.000609)

EXP 0.031430\*\*\*

(0.005863)

HOURS 0.000066

(0.002470)

TENURE 0.010871\*\*\*

(0.003581)

Constant 0.887909

(0.666039)

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Observations 540

R2 0.368746

Adjusted R2 0.353144

Residual Std. Error 0.477734 (df = 526)

F Statistic 23.635520\*\*\* (df = 13; 526)

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Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

B.

From R we get

qf(.990,2,526)

[1] 4.645725

Based on this result, we cannot reject the null hypothesis that the actual amount of hourly earnings that each additional year of schooling gives you is 8%.

**4) OLS test with Several Tests**

> college<-read.table("colleges.csv",header=TRUE,sep=",")

> lnkmedian<-log(college$kmedian)

> lnparmedian<-log(college$parmedian)

> olsu<-lm(lnkmedian~lnparmedian+public+private+ivyplus+otherelite+hselective+selective+northeast+midwest+west+pctfemale+pctmarried,data=college)

> library(stargazer)

> stargazer(olsu,type="text")

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Dependent variable:

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lnkmedian

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lnparmedian 0.374\*\*\*

(0.021)

public -0.038

(0.031)

private -0.023

(0.030)

ivyplus 0.588\*\*\*

(0.059)

otherelite 0.449\*\*\*

(0.034)

hselective 0.395\*\*\*

(0.029)

selective 0.282\*\*\*

(0.022)

northeast 0.124\*\*\*

(0.013)

midwest 0.030\*\*

(0.013)

west 0.014

(0.016)

pctfemale -0.004\*\*\*

(0.0004)

pctmarried 0.001

(0.0005)

Constant 6.257\*\*\*

(0.229)

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Observations 1,349

R2 0.609

Adjusted R2 0.606

Residual Std. Error 0.180 (df = 1336)

F Statistic 173.672\*\*\* (df = 12; 1336)

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Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Based on the results, it seems that the best college to attend for to maximize earnings at age 34 is an ivyplus school as it shows that that it gives the highest amount of additional earnings out of every other school.

B)

Ramseys RESET

> library(lmtest)

> resettest(olsu)

RESET test

data: olsu

RESET = 1.7083, df1 = 2, df2 = 1334, p-value = 0.1816

Jarque‐Bera normality test

> residuals<-resid(olsu)

> jarque.bera.test(residuals)

Jarque Bera Test

data: residuals

X-squared = 1330.6, df = 2, p-value < 2.2e-16

Breusch‐Pagan test

> residsq<-resid(olsu)^2

> bptest<-lm(residsq~lnparmedian+public+private+ivyplus+otherelite+hselective+selective+northeast+midwest+west+pctfemale+pctmarried,data=college)

> summary(bptest)

Call:

lm(formula = residsq ~ lnparmedian + public + private + ivyplus +

otherelite + hselective + selective + northeast + midwest +

west + pctfemale + pctmarried, data = college)

Residuals:

Min 1Q Median 3Q Max

-0.14339 -0.02725 -0.01071 0.00554 1.43764

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 1.594e-01 1.023e-01 1.559 0.119286

lnparmedian -9.344e-03 9.588e-03 -0.974 0.329985

public 7.067e-02 1.401e-02 5.045 5.17e-07 \*\*\*

private 7.827e-02 1.334e-02 5.867 5.59e-09 \*\*\*

ivyplus -9.958e-02 2.613e-02 -3.810 0.000145 \*\*\*

otherelite -7.997e-02 1.504e-02 -5.316 1.24e-07 \*\*\*

hselective -5.807e-02 1.312e-02 -4.425 1.04e-05 \*\*\*

selective -7.884e-02 9.950e-03 -7.924 4.82e-15 \*\*\*

northeast 2.586e-02 5.889e-03 4.391 1.22e-05 \*\*\*

midwest -3.669e-03 5.996e-03 -0.612 0.540703

west 2.631e-02 6.964e-03 3.778 0.000165 \*\*\*

pctfemale -5.106e-04 1.637e-04 -3.119 0.001855 \*\*

pctmarried -8.543e-05 2.181e-04 -0.392 0.695343

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

Residual standard error: 0.08022 on 1336 degrees of freedom

Multiple R-squared: 0.09075, Adjusted R-squared: 0.08259

F-statistic: 11.11 on 12 and 1336 DF, p-value: < 2.2e-16

C)

> olsr<-lm(lnkmedian-lnparmedian~1,data=college)

> RSSu<-sum(resid(olsu)^2)

> RSSr<-sum(resid(olsr)^2)

> Ftest<-((RSSr-RSSu)/12)/(RSSu/(1324))

> Ftest

[1] 115.1394

> qf(.95,12,1324)

[1] 1.759477

We can conclude at the 5 percent level of significance that there is a difference between those who go to a public and private school when accounting for all other factors.

D)

> coeftest(olsu,vcov=vcovHC(olsu,type="HC0"))

t test of coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 6.25672784 0.31878797 19.6266 < 2.2e-16 \*\*\*

lnparmedian 0.37378653 0.03077979 12.1439 < 2.2e-16 \*\*\*

public -0.03752859 0.04521962 -0.8299 0.40673

private -0.02334923 0.04360905 -0.5354 0.59245

ivyplus 0.58808684 0.05938228 9.9034 < 2.2e-16 \*\*\*

otherelite 0.44884004 0.04829130 9.2944 < 2.2e-16 \*\*\*

hselective 0.39542798 0.04640689 8.5209 < 2.2e-16 \*\*\*

selective 0.28196757 0.03967816 7.1064 1.933e-12 \*\*\*

northeast 0.12436750 0.01450686 8.5730 < 2.2e-16 \*\*\*

midwest 0.02989291 0.01114793 2.6815 0.00742 \*\*

west 0.01397149 0.01729513 0.8078 0.41933

pctfemale -0.00366345 0.00050517 -7.2519 6.936e-13 \*\*\*

pctmarried 0.00078845 0.00072847 1.0823 0.27930

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