

Chapter 3 - The Multiple Regression Analysis - Estimation

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Exercise 3.5

Upload packages

```
library(lmreg)
library(wooldridge)
```

Upload database

```
data<-wooldridge::wage1

attach(data)
```

5. Confirm the partialling out interpretation of the OLS estimates by explicitly doing the partialling out for Example 3.2. This first requires regressing educ on exper and tenure and saving the residuals, \hat{r}_1 . Then, regress $\log(\text{wage})$ on \hat{r}_1 . Compare the coefficient on \hat{r}_1 with the coefficient on educ in the regression of $\log(\text{wage})$ on educ, exper, and tenure.

Firstly, estimating educ against exper and tenure and saving the residuals in the variable res .

```
lm1<-lm(educ~exper+tenure)
summary(lm1)
```

```
##
## Call:
## lm(formula = educ ~ exper + tenure)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -12.4285  -1.3536  -0.2055   1.6550   5.9791
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  13.574964   0.184324  73.647  < 2e-16 ***
## exper        -0.073785   0.009761  -7.559 1.83e-13 ***
## tenure        0.047680   0.018337   2.600 0.00958 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.63 on 523 degrees of freedom
## Multiple R-squared:  0.1013, Adjusted R-squared:  0.09791
## F-statistic: 29.49 on 2 and 523 DF,  p-value: 7.327e-13
```

```
res<-lm1$residuals
```

Now, I will regress $\log(\text{wage})$ on res

```
lm2<-lm(log(wage)~res)
```

```
summary(lm2)
```

```
##
## Call:
## lm(formula = log(wage) ~ res)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.12919 -0.32803 -0.07126  0.31626  1.51357
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.62327    0.02066   78.56  <2e-16 ***
## res          0.09203    0.00788   11.68  <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4739 on 524 degrees of freedom
## Multiple R-squared:  0.2066, Adjusted R-squared:  0.205
## F-statistic: 136.4 on 1 and 524 DF,  p-value: < 2.2e-16
```

Finally, in order to analyze the results with original model

```
lm3<-lm(log(wage)~educ+exper+tenure)
```

```
summary(lm3)
```

```
##
## Call:
## lm(formula = log(wage) ~ educ + exper + tenure)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.05802 -0.29645 -0.03265  0.28788  1.42809
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.284360    0.104190   2.729  0.00656 **
## educ         0.092029    0.007330  12.555 < 2e-16 ***
## exper        0.004121    0.001723   2.391  0.01714 *
## tenure       0.022067    0.003094   7.133 3.29e-12 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4409 on 522 degrees of freedom
## Multiple R-squared:  0.316, Adjusted R-squared:  0.3121
## F-statistic: 80.39 on 3 and 522 DF,  p-value: < 2.2e-16
```

The both estimated coefficients of \hat{r}_1 and educ is equal to 0.092.