Chapter 7

Thalles Quinaglia Liduares

2022-04-23

Exercise 7.10

Upload packages

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

Upload database

```
data<-wooldridge::nbasal

attach(data)
```

Use the data in NBASAL.RAW for this exercise

(i) Estimate a linear regression model relating points per game to experience in the league and position (guard, forward, or center). Include experience in quadratic form and use centers as the base group. Report the results in the usual form.

```
summary(lm1<-lm(points~exper+guard+forward+expersq))
```

```
##
## Call:
## lm(formula = points ~ exper + guard + forward + expersq)
##
## Residuals:
##      Min      1Q  Median      3Q     Max
## -11.220  -4.268  -1.003   3.444  22.265
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   4.76076    1.17862   4.039 7.03e-05 ***
## exper         1.28067    0.32853   3.898 0.000123 ***
## guard         2.31469    1.00036   2.314 0.021444 *
## forward       1.54457    1.00226   1.541 0.124492
## expersq      -0.07184    0.02407  -2.985 0.003106 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 5.668 on 264 degrees of freedom
## Multiple R-squared:  0.09098,   Adjusted R-squared:  0.07721
## F-statistic: 6.606 on 4 and 264 DF,  p-value: 4.426e-05
```

The estimated equation is expressed as follows

$$\widehat{points} = 4.76 + 1.28exper + 2.31guard + 1.54forward - 0.07exper^2$$

(ii) Why do you not include all three position dummy variables in part (i)?

To not incur in dummy variable trap.

(iii) Holding experience fixed, does a guard score more than a center? How much more? Is the difference statistically significant?

In this case, `guards` scores 2.31 points more than `center` with statistical significance equal to 5% level.

(iv) Now, add marital status to the equation. Holding position and experience fixed, are married players more productive (based on points per game)?

```
summary(lm2<-lm(points~exper+guard+forward+expersq+marr))
```

```
##
## Call:
## lm(formula = points ~ exper + guard + forward + expersq + marr)
##
## Residuals:
##      Min      1Q  Median      3Q     Max
## -10.874  -4.227  -1.251   3.631  22.412
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  4.70294    1.18174   3.980 8.93e-05 ***
## exper        1.23326    0.33421   3.690 0.000273 ***
## guard        2.28632    1.00172   2.282 0.023265 *
## forward      1.54091    1.00298   1.536 0.125660
## expersq     -0.07037    0.02416  -2.913 0.003892 **
## marr         0.58427    0.74040   0.789 0.430751
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 5.672 on 263 degrees of freedom
## Multiple R-squared:  0.09313,    Adjusted R-squared:  0.07588
## F-statistic: 5.401 on 5 and 263 DF,  p-value: 9.526e-05
```

Yes, holding others factors fixed, married players scores, on average, 0.58 points more than single players. However, this value must be interpreted with caution because, there's no statistical significance at any representative level.

(v) Add interactions of marital status with both experience variables. In this expanded model, is there strong evidence that marital status affects points per game?

```
summary(lm3<-lm(points ~ exper + guard + forward + expersq +marr+ marrblck))
```

```
##
## Call:
## lm(formula = points ~ exper + guard + forward + expersq + marr +
##     marrblck)
##
## Residuals:
##     Min     1Q  Median     3Q     Max
## -10.874  -4.332  -1.109   3.671  22.329
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   4.76451    1.18480   4.021 7.57e-05 ***
## exper         1.24533    0.33473   3.720 0.000243 ***
## guard         2.17064    1.01207   2.145 0.032893 *
## forward       1.42530    1.01331   1.407 0.160740
## expersq      -0.07098    0.02419  -2.935 0.003634 **
## marr         -0.21028    1.21443  -0.173 0.862668
## marrblck      1.02596    1.24255   0.826 0.409732
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 5.676 on 262 degrees of freedom
## Multiple R-squared:  0.09548,    Adjusted R-squared:  0.07477
## F-statistic: 4.609 on 6 and 262 DF,  p-value: 0.0001804
```

No, even is this case, there's no suggestion of statistical significance.

(vi) Estimate the model from part (iv) but use assists per game as the dependent variable. Are there any notable differences from part (iv)? Discuss.

```
summary(lm4<-lm(assists~exper + guard + forward + expersq +marr+ marrblck))
```

```
##
## Call:
## lm(formula = assists ~ exper + guard + forward + expersq + marr +
##     marrblck)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.3193 -1.0789 -0.3192  0.6773  7.9142
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -0.251914   0.355364  -0.709 0.479022
## exper        0.438487   0.100399   4.367 1.81e-05 ***
## guard        2.540724   0.303557   8.370 3.49e-15 ***
## forward      0.496497   0.303928   1.634 0.103544
## expersq     -0.026467   0.007255  -3.648 0.000319 ***
## marr         0.658812   0.364250   1.809 0.071647 .
## marrblck    -0.435043   0.372685  -1.167 0.244142
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.702 on 262 degrees of freedom
## Multiple R-squared:  0.3532, Adjusted R-squared:  0.3384
## F-statistic: 23.85 on 6 and 262 DF,  p-value: < 2.2e-16
```

Similarly to the item (v), remains the problem of lack of statistical significance in the estimated coefficients associated to marital status.