Chapter 3 - Multiple Regression Analysis - Estimation

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Exercise 3.2

Upload packages

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

Upload database

```
data<-wooldridge::hprice1

attach(data)
```

Use the data in HPRICE1.RAW to estimate the model

$$price = \beta_0 + \beta_1 sqrft + \beta_2 bedrms + \varepsilon$$

where price is the house price measured in thousands of dollars.

(i) Write out the results in equation form.

```
lm1<-lm(price~sqrft+bdrms)

summary(lm1)
```

```
##
## Call:
## lm(formula = price ~ sqrft + bdrms)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -127.627  -42.876   -7.051   32.589  229.003
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -19.31500   31.04662  -0.622    0.536
## sqrft         0.12844    0.01382   9.291 1.39e-14 ***
## bdrms        15.19819    9.48352   1.603    0.113
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 63.04 on 85 degrees of freedom
## Multiple R-squared:  0.6319, Adjusted R-squared:  0.6233
## F-statistic: 72.96 on 2 and 85 DF,  p-value: < 2.2e-16
```

The estimated equation is given by

$$price = -19.31 + 0.12sqrft + 15.19bdrms$$

(ii) What is the estimated increase in price for a house with one more bedroom, holding square footage constant?

For each additional bedroom, the price of the house increases $15.2, *ceteris paribus*.

(iii) What is the estimated increase in price for a house with an additional bedroom that is 140 square feet in size? Compare this to your answer in part (ii).

For a house with `sqrft=140` and an additional bedroom, the price is

$$price = -19.31 + 0.12 \times (140) + 15.19 \times (1) = 12.68$$

Hence, in this case, the estimated house price is $12,680.

(iv) What percentage of the variation in price is explained by square footage and number of bedrooms?

This measure is given by R-Squared. Hence, is this case 63.1% of variability in house price is explained by these variables.

(v) The first house in the sample has sqrft = 2,438 and bdrms = 4. Find the predicted selling price for this house from the OLS regression line.

Substituing theses values in estimated equation, we obtain

$$price = -19.31 + 0.12 \times (2438) + 15.2 \times (4) = 334.05$$

Hence, in this case, the estimated house price is $334,050.

(vi) The actual selling price of the first house in the sample was $300,000 (so price 5 300). Find the residual for this house. Does it suggest that the buyer underpaid or overpaid for the house?

The residual is given by $\hat{\varepsilon} = price - \widehat{price} = 300,00 - 334,05 = -34,05$

It means that, buyer overpaid by the house.