Bjørnar's assignment in Gretl

Henrik Georg Jacobsen

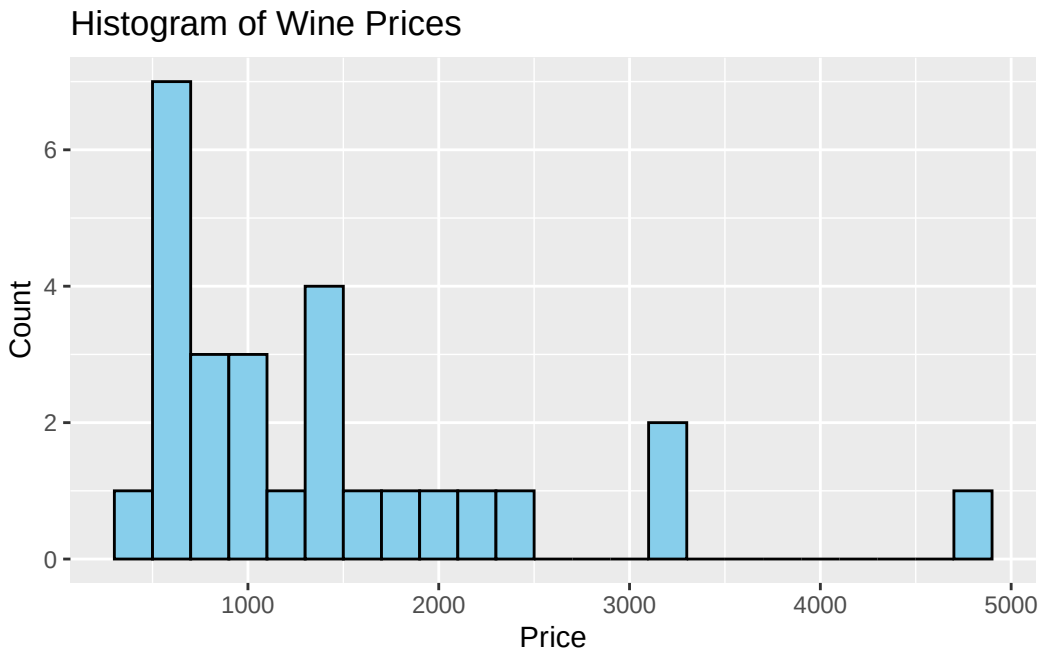
Table of contents

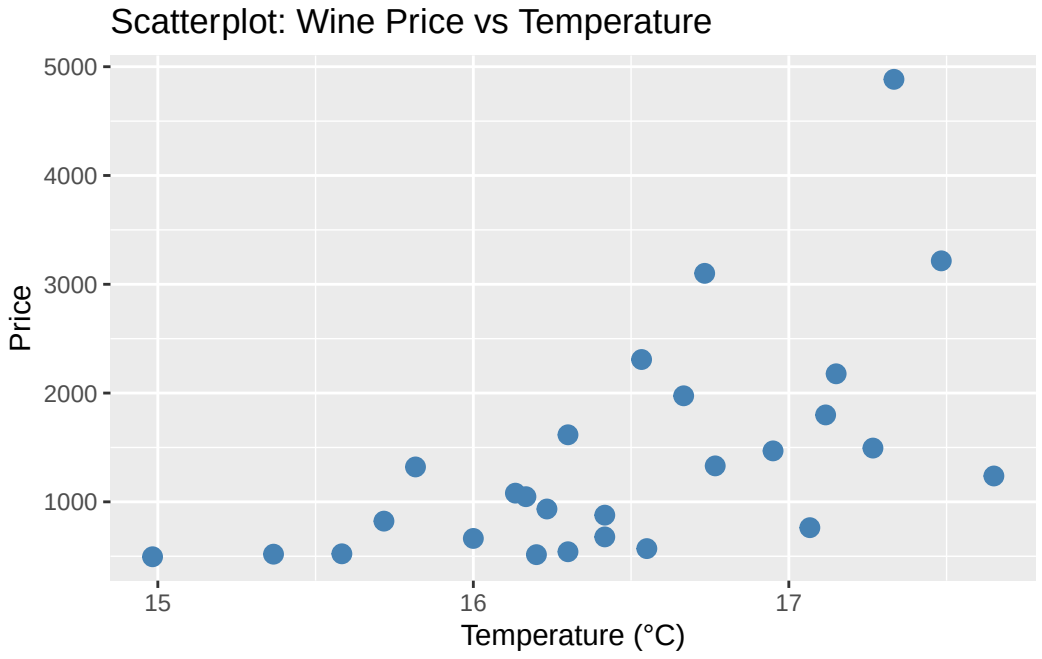
Bjørnar's assignment

Inline equations $\theta = 2 + 2$

1 Exercise 1

```
      obs           price          WinterRain        temp        HarvestRain        Age
 Min.   :1952   Min.   : 495.2   Min.   :376.0   Min.   :14.98   Min.   : 38.0   Min.   : 3.0
 1st Qu.:1959   1st Qu.: 670.8   1st Qu.:543.5   1st Qu.:16.15   1st Qu.: 88.0   1st Qu.: 9.5
 Median :1966   Median :1079.8   Median :600.0   Median :16.42   Median :123.0   Median :16.0
 Mean   :1966   Mean   :1405.8   Mean   :608.4   Mean   :16.48   Mean   :144.8   Mean   :16.1
 3rd Qu.:1973   3rd Qu.:1707.7   3rd Qu.:705.5   3rd Qu.:17.01   3rd Qu.:185.5   3rd Qu.:22.5
 Max.   :1980   Max.   :4883.9   Max.   :830.0   Max.   :17.65   Max.   :292.0   Max.   :31.0
                NA's   :2        NA's   :2       NA's   :2       NA's   :2       NA's   :2
```


Histogram of Wine Prices
Count
0
2
4
6
1000
2000
3000
4000
5000
Price


Scatterplot: Wine Price vs Temperature
Price
1000
2000
3000
4000
5000
15
16
17
Temperature (°C)

2 Exercise 2

Model 1

$$price_i = \beta_0 + \beta_1 Age_i + u_i$$

a.

```
Model 3: OLS, using observations 1-29
Dependent variable: price

             Coefficient  Std. Error  t-ratio  p-value
const         494.278      402.112     1.229   0.2304
Age           56.318       22.222      2.534   0.0179 **

R-squared: 0.2043
Adjusted R-squared: 0.1728
F-statistic: 6.420
P-value (F): 0.0179
```

b.

For each year the wine gets older, its price is expected to increase by 56.318 units.

c.

P-value (0.0179)> (0.01)

Significance level ( ) = 0.01 (1%)

$H_0 : \beta = 0$

$H_1 : \beta \neq 0$

P-value is higher than 0.01, that means age is not statistically significant.

d.

```
       Age Predicted_Price
1  3.00000          663.23
2 16.18519         1405.80
3 31.00000         2240.15
```

3 Exercise 3

Model 2

$$price_i = \beta_0 + \beta_1 Age_i + \beta_2 WinterRain_i + \beta_3 temp_i + \beta_3 HarvestRain_i + u_i$$

a.

```
Model 4: OLS, using observations 1952-1980 (T = 27)
Missing or incomplete observations dropped: 2
Dependent variable: price

               coefficient    std. error    t-ratio   p-value
  ------------------------------------------------------------
  const         -15509,0       3379,87       -4,589    0,0001   ***
  Age               39,2126      14,3490       2,733    0,0121   **
  WinterRain         2,75098      0,965119     2,850    0,0093   ***
  temp             930,787      190,557        4,885    6,97e-05 ***
  HarvestRain       -5,04694      1,61682     -3,122    0,0050   ***

Mean dependent var   1405,800   S.D. dependent var   1027,226
Sum squared resid     7238994   S.E. of regression   573,6246
R-squared            0,736141   Adjusted R-squared   0,688166
F(4, 22)             15,34443   P-value(F)           3,93e-06
Log-likelihood      -207,0499   Akaike criterion     424,0999
Schwarz criterion    430,5791   Hannan-Quinn         426,0265
```

b.

3.1 Age:

Coefficient = 39.21

P-value = 0.0121

Wine price increases by 39.21 each year.

3.2 WinterRain:

Coefficient = 2.75

P-value = 0.0093

Wine price increases by 2.75 each mm winter rainfall.

3.3 Temperature:

Coefficient = 930.79

P-value = 0.00007

Wine price increases by 930.79 every 1 degree.

3.4 HarvestRain

Coefficient = -5.05

P-value = 0.0050

Wine price decreases by 5.05 each additional 1 mm HarvestRain

c.

Adding more variables improves the model to explain the wine prices.

4 Exercise 4

Model 3

$$price_i = \beta_0 + \beta_1 Dheavyraint_i + \beta_2 tempt_i + \beta_3 temp_i \cdot Dheavyrain_i + u_i$$

a.

```
Model 2: OLS, using observations 1952-1980 (T = 27)
Missing or incomplete observations dropped: 2
Dependent variable: price

                   coefficient   std. error   t-ratio   p-value
  ------------------------------------------------------------
  const             -16289,5       4395,18     -3,706    0,0012  ***
  Dheavyrain         11634,1       8990,38      1,294    0,2085
  temp                1082,95       266,391     4,065    0,0005  ***
  temp_Dheavyrain     -756,902      546,064    -1,386    0,1790

Mean dependent var   1405,800   S.D. dependent var   1027,226
Sum squared resid    14038659   S.E. of regression   781,2660
R-squared            0,488295   Adjusted R-squared   0,421550
F(3, 23)             7,315911   P-value(F)           0,001294
```

```
Log-likelihood      -215,9914   Akaike criterion     439,9829
Schwarz criterion    445,1662   Hannan-Quinn         441,5242

Excluding the constant, p-value was highest for variable 6 (Dheavyrain)
```

b.

Temp * Dheavyrain captures whether the impact of temperature on price depends on harvest rainfall. Dheavyrain captures the shift in wine price when harvest rainfall is very high, regardless of temperature.

5 Exercise 5

a.

Model	Actual Price	Predicted Price	Residual
Model 1	4883.90	1733.28	3150.62
Model 2	4883.90	3578.80	1305.10
Model 3	4883.90	2481.70	2402.20

b.

Model 2 is the best model for predicting Bordeaux wine price.

It hast multiple significant variables and is a better fit.