Self-evaluation Tests

Vehicles 1

Instructions

- Click **Start**.
- Answer the questions.
- Click **End**.
- The cell **Score:** shows the number of right answers.
- Each question is worth 1 point.
- Click **Correct** to check the correct answers.
- The test starts on the next page.
- Recommended duration: 30 minutes.

Questions

Open the data file `vehicles.gdt` to analyse the evolution of the number of registered vehicles in the Basque Country (RV) as a linear function of the Brent oil price (BOP, in dollars).

Start Simple Linear Regression Model

1. The simple linear regression model is:

(a) $RV_t = \beta_1 + \beta_2 + u_t$

(b) $RV_t = \beta_1 + \beta_2\, BOP_t + u_t$

(c) $RV_t = \beta_2\, BOP_t$

(d) $RV_t = \beta_1 + \beta_2\, BOP_t$

2. The dependent variable is:

(a) β_2 (b) BOP (c) RV (d) u

3. The explanatory variable is:

(a) β_2 (b) BOP (c) RV (d) u

4. The error term is:

(a) β_2 (b) BOP (c) RV (d) u

5. The sample size is:

$T =$ [ ]

6. The sample mean of the number of registered vehicles is:

(a) 3893.463 (b) 6436.84 (c) 1255.115 (d) 966.7194

7. The standard deviation of the number of registered vehicles is:

(a) 3893.463 (b) 6436.84 (c) 1255.115 (d) 966.7194

8. Population Regression Function:

(a) $RV_t = \beta_1 + \beta_2 \, BOP_t$

(b) $\widehat{RV}_t = \hat{\beta}_1 + \hat{\beta}_2 \, BOP_t$

(c) $\widehat{E(RV)}_t = \hat{\beta}_1 + \hat{\beta}_2 \, BOP_t$

(d) $E(RV)_t = \beta_1 + \beta_2 \, BOP_t$

9. The OLS estimator of β_1 is:

(a) $\hat{\beta}_1 = \overline{RV} + \hat{\beta}_2 \, \overline{BOP}$

(b) $\hat{\beta}_1 = RV_t + \hat{\beta}_2 \, BOP_t$

(c) $\hat{\beta}_1 = \overline{RV} - \hat{\beta}_2 \, \overline{BOP}$

(d) $\hat{\beta}_1 = RV_t - \hat{\beta}_2 \, BOP_t$

10. The OLS estimator of β_2 is:

(a) $\hat{\beta}_2 = \dfrac{\sum RV_t \ BOP_t}{\sum BOP_t^2}$

(b) $\hat{\beta}_2 = \dfrac{\sum (RV_t - \overline{RV})\,(BOP_t - \overline{BOP})}{\sum (RV_t - \overline{RV})^2}$

(c) $\hat{\beta}_2 = \dfrac{\sum RV_t \ BOP_t}{\sum RV_t^2}$

(d) $\hat{\beta}_2 = \dfrac{\sum (RV_t - \overline{RV})\,(BOP_t - \overline{BOP})}{\sum (BOP_t - \overline{BOP})^2}$

11. Sample Regression Function:

(a) $RV_t = 6436.84 - 44.1921\, BOP_t$

(b) $\widehat{RV}_t = 6436.84 - 44.1921\, BOP_t$

(c) $\widehat{RV}_t = 6436.84 - 44.1921\, \widehat{BOP}_t$

(d) $RV_t = -44.1921 + 6436.84\, BOP_t$

12. The estimated number of registered vehicles for January 2007 is:

(a) 6436.84 (b) 4570.750 (c) 5366.972 (d) 2778.452

13. The OLS residual for September 2008 is:

(a) -796.362 (b) 118.250 (c) 1958.046 (d) -371.483

14. The coefficient of determinations is:

(a) 0.412299 (b) 0.406755 (c) 41.2299 (d) 0.412299%

15. The coefficient of determination is:

(a) The ratio between the variance of BOP and the variance of RV.

(b) The percentage of the sample variability in the price of Brent that explains the number of registered vehicles.

(c) The proportion of the sample variability in the number of registered vehicles explained by the variability in the price of Brent.

(d) The difference between the total variability in the number of registered vehicles and the variability in the price of Brent.

16. Which equality is true?

(a) $R^2 = r^2_{RV,BOP}$ (b) $R^2 = r_{RV,BOP}$

(c) $R^2 = cov(RV, BOP)$ (d) $R^2 > r_{RV,BOP}$

17. An unbiased estimator of the variance of the error term is:

(a) $\frac{\sum \hat{u}_t^2}{T}$ (b) $\frac{\sum \hat{u}_t^2/q}{T-k}$ (c) $\frac{\sum \hat{u}_t^2}{T-k}$ (d) $\frac{\sum \hat{u}_t}{T-k}$

18. The estimated variance of the error term is:

(a) 966.7194 (b) 917240.019 (c) 99061922 (d) 934546.398

19. An unbiased estimator of the variance of $\hat{\beta}_2$ is:

(a) $\frac{\sigma^2}{\sum(BOP_t - \overline{BOP})^2}$ (b) $\frac{\hat{\sigma}^2}{\sum(BOP_t - \overline{BOP})^2}$

(c) $\frac{\sigma^2}{\sum(RV_t - \overline{RV})^2}$ (d) $\frac{\hat{\sigma}^2}{\sum(RV_t - \overline{RV})^2}$

20. The estimated variance of $\hat{\beta}_2$ is:

(a) 5.12464 (b) 1255.115 (c) 26.2619351 (d) 20.8137

Test whether the sample regression function lays on the point (0,0), that is on the coordinates origin.

1. The null hypothesis is:

(a) $\beta_1 = \beta_2 = 0$

(b) $\beta_1 + \beta_2 = 0$

(c) $\beta_2 = 0$

(d) $\beta_1 = 0$

2. The test statistic is:

(a) $t = \frac{\hat{\beta}_1}{\hat{\sigma}_{\hat{\beta}_1}} \overset{H_0}{\sim} t(T-k)_\alpha$

(b) $t = \frac{\hat{\beta}_2}{\hat{\sigma}_{\hat{\beta}_2}} \overset{H_0}{\sim} t(T-k)$

(c) $t = \frac{\hat{\beta}_1}{\hat{\sigma}_{\hat{\beta}_1}} \overset{H_0}{\sim} t(T-k)$

(d) $\frac{R^2}{(1-R^2)/(T-k)} \overset{H_0}{\sim} \mathcal{F}(1, T-k)$

3. The sample regression function lays on the point (0,0) (α =5%).

(a) True

(b) False

Test whether the variable BOP is statistically significant.

1. The null hypothesis is:

(a) $\beta_1 = \beta_2 = 0$ (b) $\beta_1 + \beta_2 = 0$
(c) $\beta_2 = 0$ (d) $\beta_1 = 0$

2. The test statistic is:

(a) $t = \frac{\hat{\beta}_2}{\hat{\sigma}_{\hat{\beta}_2}} \overset{H_0}{\sim} t(T-k)_\alpha$ (b) $t = \frac{\hat{\beta}_2}{\hat{\sigma}_{\hat{\beta}_2}} \overset{H_0}{\sim} t(T)$

(c) $t = \frac{\hat{\beta}_2}{\hat{\sigma}^2_{\hat{\beta}_2}} \overset{H_0}{\sim} t(T-k)$

(d) $\frac{R^2}{(1-R^2)/(T-k)} \overset{H_0}{\sim} \mathcal{F}(1, T-k)$

3. The variable BOP is statistically significant (α =5%).

(a) True (b) False

End Correct