List 02. Inferences for Linear Regression

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1 t-test

For each text calculate related critical values.

1.1 Significance

#**1**. For the dataset `sleep75` consider a regression

`sleep on totwrk, age, male, south, smsa`.

1. Fit the regression
2. For each coefficient evaluate s.e., t-stat & p-value for t-test on the significance

3. Evaluate a related critical value

4. For each coefficient perform t-test for the significance and state a testing hypothesis. Make conclusions

#**2**. For the dataset `Labour` consider a regression

`log(output) on log(capital), log(labour), log(wage)`.

1. Fit the regression

2. For each coefficient evaluate s.e., t-stat & p-value for t-test on the significance

3. Evaluate a related critical value

4. For each coefficient perform t-test for the significance and state a testing hypothesis. Make conclusions

#**3**. For the dataset `wage2` consider a regression

`log(wage) on age, IQ, south, urban, married`.

1. Fit the regression

2. For each coefficient evaluate s.e., t-stat & p-value for t-test on the significance

3. Evaluate a related critical value

4. For each coefficient perform t-test for the significance and state a testing hypothesis. Make conclusions

#**4**. For the dataset `Electricity` consider a regression

`log(cost) on log(q), log(pk), log(pl), log(pf)`.

1. Fit the regression

2. For each coefficient evaluate s.e., t-stat & p-value for t-test on the significance

3. Evaluate a related critical value

4. For each coefficient perform t-test for the significance and state a testing hypothesis. Make conclusions

1.2 General t-test

#**5**. For the dataset `Labour` consider a regression

`log(output) on log(capital), log(labour).`

Test a hypothesis $H_0 : \beta_{capital} = 0.5$. How can we interpret the testing hypothesis?

#**6**. For the dataset `Labour` consider a regression

`log(output) on log(capital), log(labour).`

Test a hypothesis $H_0 : \beta_{labour} = 0.7$. How can we interpret the testing hypothesis?

#**7**. For the dataset `Electricity` consider a regression

`log(cost) on log(q), log(pl), log(pk), log(pf).`

Test a hypothesis $H_0 : \beta_q = 1$. How can we interpret the testing hypothesis?

#**8**. For the dataset `Electricity` consider a regression

`log(cost) on log(q), log(pl), log(pk), log(pf).`

Test a hypothesis $H_0 : \beta_{pf} = 1$. How can we interpret the testing hypothesis?

#**9**. For the dataset `sleep75` consider a regression

`sleep on totwrk, age, south, male, smsa, yngkid, marr, union.`

Test a hypothesis $H_0 : \beta_{male} = 90$. How can we interpret the testing hypothesis?

#**10**. For the dataset `sleep75` consider a regression

`sleep on totwrk, age, south, male, smsa, yngkid, marr, union.`

Test a hypothesis $H_0 : \beta_{south} = 100$. How can we interpret the testing hypothesis?

2 F-test

For each text calculate related critical values.

2.1 Overall significance

#**1**. For the dataset `sleep75` consider a regression

`sleep on totwrk, age, south, smsa`.

Test overall significance of the regression and state the testing hypothesis

#**2**. For the dataset `sleep75` consider a regression

`sleep on smsa,yngkid, marr, union`.

Test overall significance of the regression and state the testing hypothesis

#**3**. For the dataset `sleep75` consider a regression

`sleep on smsa,yngkid, marr, union`.

Test overall significance of the regression and state the testing hypothesis

#**4**. For the dataset `Electricity` consider a regression

`log(cost) on log(q), log(pl), log(pk), log(pf)`.

Test overall significance of the regression and state the testing hypothesis

#**5**. For the dataset `Electricity` consider a regression

`log(cost) on log(pl), log(pk), log(pf)`.

Test overall significance of the regression and state the testing hypothesis

2.2 Joint significance

#**6**. For the dataset `sleep75` consider a regression

`sleep on totwrk, age, male, south, smsa, yngkid, marr, union`.

Test joint significance of regressors `smsa, yngkid, marr, union` and state the testing hypothesis

#**7**. For the dataset `sleep75` consider a regression

`sleep on totwrk, age, age`^{2}`, male, south`.

Test the significance of age and state the testing hypothesis

#**8**. For the dataset `sleep75` consider a regression

`sleep on totwrk, age, age`^{2}`, male, south, male*totwrk`.

Test the significance of gender dummy and state the testing hypothesis

2.3 Linear restrictions

#**9**. For the dataset `Labour` consider a regression

`log(output) on log(capital), log(labour), log(wage)`.

1. Test a hypothesis $H_0 : \beta_{capital} + \beta_{labour} + \beta_{wage} = 1$ and give its interpretation
2. Test a hypothesis $H_0 : \beta_{labour} = \beta_{wage}$ and give its interpretation
3. Test a hypothesis $H_0 : \beta_{capital} = \beta_{labour} = \beta_{wage}$ and give its interpretation

#**10**. For the dataset `Electricity` consider a regression

`log(cost) on log(q), log`^{2}`(q), log(pl), log(pk), log(pf)`.

1. Test a hypothesis $H_0 : \beta_{pf} + \beta_{pl} + \beta_{pk} = 1$ and give its interpretation
2. Test a hypothesis $H_0 : \beta_{pl} = \beta_{pk}$ and give its interpretation
3. Test a hypothesis $H_0 : \beta_{pf} = \beta_{pl} = \beta_{pk}$ and give its interpretation

2.4 Structural breaks

#**11**. For the dataset `sleep75` consider a regression

`sleep on totwrk, age, age`^{2}`, south, smsa, marr`.

Fit the regression

- for men $sleep = \beta_0 + \beta_1 totwrk + \beta_2 age + \beta_3 age^2 + \beta_4 south + \beta_5 smsa + \beta_6 marr + u$
- for women $sleep = \gamma_0 + \gamma_1 totwrk + \gamma_2 age + \gamma_3 age^2 + \gamma_4 south + \gamma_5 smsa + \gamma_6 marr + v$

Perform Chow test across a gender dummy, i.e. test a hypothesis

$$H_0 : \beta_j = \gamma_j \qquad\qquad j = 0, \ldots, 6$$

#**12**. For the dataset `sleep75` consider a regression

`sleep on totwrk, age, age`^{2}`, male, smsa, marr`.

Perform Chow test across a geographical dummy (`south`).

#**13**. For the dataset `wage1` consider a regression

`log(wage) на exper, exper`^{2}`, married, smsa`.

Perform Chow test across a gender dummy.

#**14**. For the dataset `wage1` consider a regression

`log(wage) на exper, exper`^{2}`, female, smsa`.

Perform Chow test across a married dummy.

3 Confidence intervals

#**1**. For the dataset `sleep75` consider a regression

`sleep on totwrk, age, south, male, smsa, yngkid, marr`.

Evaluate 90%-level confidence intervals for coefficients.
Which are significant at 10%-significant level?

#**2**. For the dataset `Labour` consider a regression

`log(output) on log(capital) и log(labour)`.

Evaluate 95%-level confidence intervals for coefficients.
Which are significant at 5%-significant level?

#**3**. For the dataset `Electricity` consider a regression

`log(cost) on log(q), log`^{2}`(q), log(pl), log(pk), log(pf)`.

Evaluate 99%-level confidence intervals for coefficients.
Which are significant at 1%-significant level?