Exercise - Week 3

Part 1: Housing Prices and Air Pollution

1 Load Hprice2.dta.

2 Construct the log of the following variables: price, nox and dist.

gen lprice = ln(price)

gen lnox = ln(nox)

gen ldist = ln(dist)

3 Perform the following regression:

$$\ln price_i = \beta_0 + \beta_1 \ln nox_i + \beta_2 \ln dist_i + \beta_3 rooms + \beta_4 stratio + u_i$$

What is the elasticity of housing prices with respect to the change of the amount of nitrogen oxide?

4 We want to test for the following null hypothesis:

$$H_0 \quad : \quad \beta_1 = 1$$

$$H_A \quad : \quad \beta_1 \neq 1$$

- Construct the t-statistic.
- Compute the 95% confidence interval ($t_{0.025} = 1.96$).
- Compute the 99% confidence interval ($t_{0.005} = 2.57$).
- What conclusion can you reach for the above null hypothesis.

Part 2: Global Warming

1 Load the global.dta data set.

2 Construct the log of the following variables: temperature, Co2 concentration:

gen lntemp = ln(temp)

gen lnco2 = ln(co2)

3 Construct dummies for each half centuries. To this end, type:

gen dperiod = year

recode dperiod min/1800 = 1 1800/1850 = 2 1850/1900 = 3 1900/1950 = 4 1950/max = 5

tab dperiod, gen(dperiod)

4 Discuss what kind of problem you would face in the following regression:

$$\ln temp_t = \beta_0 + \beta_1 dperiod_{t1} + \beta_2 dperiod_{t2} + \beta_3 dperiod_{t3} + \beta_4 dperiod_{t4} + \beta_5 dperiod_{t5} + \varepsilon_t$$

5 Perform the following regression:

$$\ln temp_t = \beta_0 + \beta_2 dperiod_{t2} + \beta_3 dperiod_{t3} + \beta_4 dperiod_{t4} + \beta_5 dperiod_{t5} + \varepsilon_t$$

Is the temperature higher in the 20th century compared to the period 1700-1800?

6 Perform the following regression:

$$\ln temp_t = \beta_0 + \beta_1 \ln co2_t + \beta_2 dperiod_{t2} + \beta_3 dperiod_{t3} + \beta_4 dperiod_{t4} + \beta_5 dperiod_{t5} + \varepsilon_t$$

Interpret the coefficients on the time periods. Are there any changes in the estimates with and without including lnco2? If so, why?

7 Test for the following null hypothesis:

$$H_0 : \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0.$$

To this end, compute first the R^2 of the unrestricted model and then the R^2 of the restricted one. Compute the F ratio. (The critical value is equal to 2.37).

8 Test for the following null and alternative hypotheses:

$$\begin{aligned} H_0 &: \beta_2 = \beta_3, \beta_4 = \beta_5 \\ H_A &: \beta_2 \neq \beta_3, \beta_4 \neq \beta_5 \end{aligned}$$

(The critical value is equal to 3.00).