Problem Set 4

AGEC 317

This problem set refers to the Excel document "PS4.xlsx"

Please complete the work for this Problem Set within the "PS4.xlsx" document, and submit your edited version with answers to eCampus by **March 3rd at 11:59PM**.

You have data on: the price (in USD) of a sold home (*price*), the local crime rate near the home in % (*crime*), the local concentration of NO_x in PPM (*nox*), the number of rooms in the sold house (*rooms*), and the local property tax rate (in %) for the home (*proptax*).

1. See the sheet labelled "#1". Here you have the data as described above, with 506 observations. Using the Data Analysis ToolPak, estimate the following model:

$$price_i = \beta_0 + \beta_1 crime_i + \beta_2 nox_i + \beta_3 rooms_i + \beta_4 proptax_i + u_i$$

   Put the regression results in the same sheet as the data (sheet "#1"). Given the regression results answer the following questions in a text-box inserted into sheet #2:

   - Is the model jointly significant? Why or why not?
   - Which variables are significant?
   - Interpret the significant variables; what does each significant coefficient mean (*Hint: your answer should look something like: "A unit increase in ... is associated with ... in the price of a house"*)?

2. See the sheet labelled "#1". You have the same data as in "#1". Nitrous oxides are related to sulfur oxides emissions; when NO_x is emitted, so is SO_x. Specifically: $SO_x = NO_x + 1$. That is, the PPM concentration of sulfur oxides are always greater than nitrous oxide by one unit. Please do the following:

   - Create a new variable SO_x, calculated using known relationship between SO_x and NO_x.
   - Using the Data Analysis ToolPak, estimate the following model:

$$price_i = \beta_0 + \beta_1 crime_i + \beta_2 nox_i + \beta_3 rooms_i + \beta_4 proptax_i + \beta_5 sox_i + u_i$$

   - What is the effect of sulfur oxides emissions on housing prices, *ceteris paribus*? If you cannot find an effect, explain why. (*Which OLS assumption(s) is/are violated that prevent estimation?*)

3. Return to your results from "#1". In sheet "#3", explain in words (using textboxes or inserted images of text) the following:

   - Given the results from #1, do nitrous oxide emissions affect house prices? If NO_x near your house increased, would the value of your home increase or decrease?
   - Provide an example of an *omitted variable* that could cause bias in your estimated model, and why the omission is causing bias.