Hoja de Ejercicios 6 Regresión Múltiple

Estadística-II. INTRODUCCIÓN a la ECONOMETRÍA. UC3M

1. (Exercise 3.9, Wooldridge (2002)). The following equation describes the median housing price in a community in terms of amount of pollution (*nox* for nitrous oxide) and the average number of rooms in houses in the community (*rooms*): :

 $log(price) = \beta_0 + \beta_1 log(nox) + \beta_2 rooms + u$

- (i) What are the probable signs of β_1 and β_2 ? What is the interpretation of β_1 ? Explain.
- (ii) Why might nox [more precisely, log(nox)] and rooms be negatively correlated? If this is the case, does the simple regression of log(price) on log(nox) produce an upward or downward biased estimator of β_1 ?
- (iii) Using the data in HPRICE2.RAW, the following equations were estimated:

$$log(price) = 11,71 - 1,043log(nox), n = 506, R^2 = 0,264$$

$$log(price) = 9,23 - 0,718 \ log(nox) + 0,306 \ rooms, n = 506, R^2 = 0,514$$

Is the relationship between the simple and multiple regression estimates of the elasticity of price with respect to *nox* what you would have predicted, given your answer in part (ii)? Does this mean that ,718 is definitely closer to the true elasticity than 1,043?

2. (Ejercicio 3.14, Wooldridge (2002)). Use the data in HPRICE1.RAW to estimate the model

$$price = \beta_0 + \beta_1 sqrft + \beta_2 bdrms + u$$

where price is the house price measured in thousands of dollars, sqrtft is square footage and bdrms is the number of bedrooms.

- (i) Write out the results in equation form.
- (ii) What is the estimated increase in price for a house with one more bedroom, holding square footage constant?
- (iii) What is the estimated increase in price for a house with an additional bedroom that is 140 square feet in size? Compare this to your answer in part (ii).
- (iv) What percentage of the variation in price is explained by square footage and number of bedrooms?
- (v) The first house in the sample has sqrft = 2,438 and bdrms = 4. Find the predicted selling price for this house from the OLS regression line.
- (vi) The actual selling price of the first house in the sample was \$300,000 (so *price* = 300). Find the residual for this house. Does it suggest that the buyer underpaid or overpaid for the house?

- 3. (Ejercicio 3.15, Wooldridge (2002)). The file CEOSAL2.RAW contains data on 177 chief executive officers, which can be used to examine the effects of firm performance on CEO salary.
 - (i) Estimate a model relating annual salary to firm sales and market value. Make the model of the constant elasticity variety for both independent variables. Write the results out in equation form.
 - (ii) Add *profits* to the model from part (i). Why can this variable not be included in logarithmic form? Would you say that these firm performance variables explain most of the variation in CEO salaries?
 - (iii) Add the variable *ceoten* to the model in part (ii). What is the estimated percentage return for another year of CEO tenure, holding other factors fixed?
 - (iv) Find the sample correlation coefficient between the variables log(mktval), the logarithm of the market value, and *profits*. Are these variables highly correlated? What does this say about the OLS estimators?