

Economics 471: Econometrics

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Problem Set #2

1. Please describe the relationship between the following
 - (a) β and $\hat{\beta}$
 - (b) u and \hat{u}
 - (c) The population model and the sample model
2. Describe the two assumptions used in class (least-squares and normal equations) to derive the OLS estimates of the intercept and slope. Are these assumptions explicit or implicit assumptions?
3. In the formula $\hat{\beta} = \beta + \left[\sum_{i=1}^n (x_i - \bar{x}) u_i \right] / \left[\sum_{i=1}^n (x_i - \bar{x})^2 \right]$, explain the importance of each term.
4. Consider two variables: cigarette consumption and income.
 - (a) Which variable should be the dependent variable and which variable is the independent variable?
 - (b) Write down a model that is linear in parameters that captures the causality you just described.
 - (c) Using the dataset `smoke.xls`¹, what is the average yearly income for a person in the sample and what is the average number of cigarettes smoked per day?
 - (d) How many nonsmokers are there in the dataset? Do you think this percentage is indicative of everyday people?
 - (e) Use OLS to determine the intercept and slope coefficient in the sample. Interpret your slope coefficient.
 - (f) Does yearly income explain most of the variation in cigarettes smoked per day?
 - (g) What is the income elasticity of cigarettes calculated at the average of the variables?
5. Consider two variables: sleeping and work.
 - (a) Use the dataset `sleep75.xls` to determine the average number of hours slept per week and the average number of hours worked per week.
 - (b) Estimate a linear relationship that characterizes the casual relationship you described above. Give the output and highlight your intercept and slope coefficient along with the R^2 .
 - (c) Provide an interpretation of your estimated coefficients.

¹All datasets for the homeworks can either be found using the password from the textbook or by using a search engine such as google.com.