EC220-PS2
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Office hour: on Monday in S684 from 17:30 to 18:30
PS2

• First 2 problems (1.3 and 1.4, textbook example p.56): same as PS1, but add the interpretation of the R2.
• 3rd problem (1.6), go back to the least squares (OLS) principles.
• 4th problem (2.3), our first proofs of the properties of the estimator.
Main mistakes for Exercises 1/2

I  Econometric crimes

• Interpreting the regression results as the effect of S (dependent var) on ASVABC (expl. Var.) ! (fail the exam)
• Do not state the definitions of the dependent and the explanatory variables or the units of each of the variables. Sloppy statements as:
  « S is positively correlated with ASVABC », …

II  Mistakes

• You are expected to give a precise meaning of each estimates and to explain if the estimate makes sense or not. You can use your other economic courses, your common sense.
• Vague definition or interpretation of the R2.
R2 interpretation, goodness of fit

\[ \text{TSS} = \text{ESS} + \text{RSS} \]

Does this always hold (for any regression model fitted by OLS)?

\[
R^2 = \frac{\text{ESS}}{\text{TSS}} = \frac{\sum (\hat{Y}_i - \bar{Y})^2}{\sum (Y_i - \bar{Y})^2}
\]

\[
R^2 = \frac{\text{TSS} - \text{RSS}}{\text{TSS}} = 1 - \frac{\sum e_i^2}{\sum (Y_i - \bar{Y})^2}
\]

The proportion of the variance of \( Y \) explained by the regression equation.

Square of the coefficient of correlation between the true values of \( Y \) and the fitted values.

\[
r_{Y,\hat{Y}} = \frac{\sum (Y_i - \bar{Y})(\hat{Y}_i - \bar{Y})}{\sqrt{\sum (Y_i - \bar{Y})^2 \sum (\hat{Y}_i - \bar{Y})^2}}
\]

Why can the R2 be low? It may be the case that \( S \) depends on ASVABC but also on other important variables. For example, parental education, parental income… The true relationship may also be non linear (why?).
Main mistakes for Exercise 4

Econometric crimes when you try to prove the unbiasedness of an estimator

• Take the expected value of the parameter to prove that the estimator is unbiased.

• Make a confusion between the disturbance term and the residuals.

• Writing a proof without stating the assumptions used to derive the main results (X non stochastic, E(ui)=0, …).

• Use « strange » rules to compute the expectation (E(x/y) is not equal to E(x)/E(y) in general).