

Introductory Econometrics

Tutorial 6

PART A: To prepare for this week's quiz read the lecture notes for Topic 6

Part B: This part will be covered in the tutorial. It is still a good idea to attempt these questions before the tutorial.

The purpose of this tutorial is to practice hypothesis testing.

1. *Practice with t-test and F-test:* (This is based on problem 3 at the end of Chapter 3 of the textbook): The following multiple regression model is used to study the trade-off between time spent sleeping and working and to look at other factors affecting sleep:

$$sleep = \beta_0 + \beta_1 totwrk + \beta_2 educ + \beta_3 age + u$$

where *sleep* and *totwrk* are measured in minutes per week and *educ* and *age* are measured in years.

- (a) If adults trade-off sleep for work, what is the sign of β_1 ?
- (b) What signs do you think β_2 and β_3 will have?
- (c) Using data from a random sample of 706 adults, we have estimated the following equation:

$$\begin{aligned}\widehat{sleep} &= 3638.25 - 0.148totwrk - 11.13educ + 2.20age & (1) \\ &\quad (112.27) \quad (0.017) \quad (5.88) \quad (1.45) \\ R^2 &= 0.113, SSR = 123455057\end{aligned}$$

Test the hypothesis that adults do not trade-off sleep for work against the alternative that they do at the 1% level of significance.

- (d) We have also estimated the following regression:

$$\begin{aligned}\widehat{sleep} &= 3586.38 - 0.151totwrk & (2) \\ &\quad (38.91) \quad (0.017) \\ SSR &= 124858119\end{aligned}$$

Test the joint hypothesis given work time, education and age have no effect on sleep time versus the alternative that at least one of them does. Perform this test at the 5% level of significance.

- (e) Compute the R^2 of the regression (2).
- (f) Suppose that someone suggests that one year of education keeping all else constant has the same effect but with opposite sign of the effect of one more year of age keeping all else constant. That is, $\beta_2 = -\beta_3$. Explain how you would test this hypothesis with an F -test. You need to state the alternative hypothesis that can be tested with an F -test, specify any extra regression that you need to estimate, and explain how you would use the results of that regression to test this hypothesis.
- (g) Suppose the alternative hypothesis of interest was $\beta_2 < -\beta_3$. Explain how you would test $H_0 : \beta_2 = -\beta_3$ against this one-sided alternative.
- (h) We have performed the tests in (f) and (g) using our sample and in we could not reject the null hypothesis in either of these cases (you can verify these using sleep75.wf1 afte the tutorial - solutions will be provided at the end of the week). In the light of the results of these tests, comment on how focusing on the magnitude of OLS estimates without any notice of their standard errors can be misleading.