Temple University
Department of Economics

Econ 3503 – Introduction to Econometrics

Chapter 2 Exercises – Confidence intervals and hypothesis testing

3.1. The following is an estimated regression for a weekly household food expenditure with 40 observations (where *x* is weekly income and *y* is food expenditure, both are in U.S. dollars; standard errors of estimated coefficients are in parentheses).

$$\hat{y}_i = 158.35 + 0.169 x_i$$

$$se = (62.41) \quad (0.088)$$

(a) Construct a 99% confidence interval estimate for the slope.

We will use Student's t statistic in this and all subsequent exercises

[0.169 ± 2.712(.088)] = [-0.07, 0.408]

As an acceptable answer use t=2.704 because the t-table in the book skips from 30 to 40 degrees of freedom.

(b) Test the null hypothesis that the slope coefficient is insignificant, against the alternative that it is different from zero, at the 5% level of significance.

t = (0.169/.088) = 1.92

$t^{.05}$ = 2.024 (or 2.021 from nearest table entry)

Since the observed t is less than the critical t we do not reject.

Or, since the p-value for t=1.92 is .0623>.05 we do not reject.

(c) Give the economic interpretation of the slope coefficient.

When your income rises by $1.00, your food expenditure rises by $0.169.

3.2. The manager of an engineering firm selects 20 technicians at random and estimates their quality rating (RATING) based on work experience (EXPER) in years. The RATING takes a value of 1 through 10, with 1=poor and 10=excellent. The table gives the estimation output for the model:

$$RATING = \beta_1 + \beta_2 EXPER + e$$

Dependent Variable: RATING Included Observations: 20		
Variable	Coefficient	Standard Error
CONSTANT EXPER	3.627 0.954	1.695 0.423

Construct a 90% confidence interval for the slope and explain its meaning.

We want half the probability in each tail and choose a t with 5% in each tail to get [.954±1.734*0.423]=[0.221, 1.687]

We are 90% confident that the true mean lies in the above interval. That is, we have used a method such that out of 100 so constructed intervals, 90 would contain the true mean.

3.3. In a simple regression, the test of significance for a coefficient estimate of –44.546 gives the *t*-statistic of –8.022. What is the estimated variance for the coefficient?

-44.546/8.022 = 5.553

Var(β) = 5.553^2 = 30.836

3.4. In an estimated simple regression, based on 41 observations, the estimated slope equals 3.204 and its standard error equals 1.223.

(a) Test the hypothesis that the slope is zero, against the alternative that it is not, at the 1% level of significance.

Put half the probability in each tail and look up the critical t-stat: $t^{.005}$ = 2.708 (or the tabulated 2.704 for 40 dof)

3.204/1.223 = 2.62

Again, the observed t is less than the critical t so we do not reject the null.

(b) Test the hypothesis that the slope is zero, against the alternative that it is positive, at the 1% level of significance.

This time the probability all goes in the upper tail, so the t-stat is 2.426 (tabulated t=2.423). This time we reject the null.