**Quiz N1**

**Student’s full name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Student ID\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. (4 Points)The output of the regression estimate in STATA is given below, where CHILDREN means number of children in the family and SM is the years of schooling of the mother:



1. Write the regression equation and give the interpretation of the coefficients of the equation.
2. What is the amount of TSS, RSS.
3. Provide the interpretation of the R2. Provide a 95%, 99% confidence interval for the estimation of the parameter of mother’s schooling. Perform all appropriate statistical tests.

Answers:

1. Children=7.19 - 0.25SM The intercept does not have actual meaning, however a
	1. (0.031)

formal explanation is that mothers with 0 level of schooling will have 7.19 children; the coefficient β2=-0.25 means that one year an increase in mother’s schooling will mean a decrease in number of children by 0.25.

1. TSS=2579.437; RSS=2306.74
2. R2=0.104 it explains that the 10.4% variation in the number of children is explained by mothers’ education ( or by the whole regression equation). Or 10.4 percent the relationship fitted by the regression equation.

 -0.314≤ SM≤ -0.190

1. t=-7.98; tcr(0.01,538)=2.576 then |t|>tcr then H0 is rejected, and the coefficient on SM is highly significant.

 t=19.08 for the intercept, is also highly significant.

 F= 63.4; Fcr(0.05,1,538)=3.84 is also highly significant , because F>Fcr and H0 is rejected.

1. A researcher is evaluating whether an increase in the minimum hourly wage has had an effect on employment in the manufacturing industry in the following three months. Taking a sample of 25 firms, what should she conclude if:

(a) the mean decrease in employment is 9 per cent, and the standard error of the mean is 5 per cent

(b) the mean decrease is 12 per cent, and the standard error is 5 per cent

(c) the mean decrease is 20 per cent, and the standard error is 5 per cent

 (d) there is a mean *increase* of 10 per cent, and the standard error is 5 percent?

Answers: There are 24 degrees of freedom, and hence the critical values of *t* at the

5 per cent, 1 per cent, and 0.1 per cent levels are 2.06, 2.80, and 3.75,

respectively.

(a) The *t* statistic is –1.80. Fail to reject *H*0 at the 5 per cent level.

(b) *t* = –2.40. Reject *H*0 at the 5 per cent level but not the 1 per cent level.

(c) *t* = –4.00. Reject *H*0 at the 1 per cent level. Better, reject at the 0.1 per

cent level.

(d) *t* = 2.00. Fail to reject *H*0 at the 5 per cent level

Problem #3

A researcher hypothesizes that years of schooling, S, may be related to the number of siblings ( brothers and sisters), SIBLINGS, according to the relationship

S=β1+ β2SIBLINGS+u.

She is prepared to test the null hypothesis H0: β2=0 against the alternative hypothesis H1: β2≠0 at the 5 percent and 1 percent levels. She has a sample of 60 observations. What should she report:

1. If b2=-0.20, s.e.( b2)=0.07?
2. If b2=-0.12, s.e.( b2)=0.07?
3. If b2=0.06, s.e.( b2)=0.07?
4. If b2=0.20, s.e.( b2)=0.07?
5. Explain whether it would have been justifiable to perform one-sided tests instead of two-sided. If you think that one-sided tests are justified, perform them and state whether the use of a one-sided test makes any difference.

Answers:

There are 58 degrees of freedom, and hence the critical values of t at the 5 percent, 1 percent, and 0.1 percent levels are 2.00, 2.66, and 3.46, respectively. a. The t statistic is 2.86. Reject H0 at the 1 percent level.

b. t = –1.71. Fail to reject at the 5 percent level.

c. t = 0.86. Fail to reject at the 5 percent level.

d. t = 2.86. Reject H0 at the 1 percent level.

e) First, there should be a discussion of whether the parameter β2 can be assumed not to be positive. If this is the case (and the literature has produced much evidence that this is the case), the critical values of t at the 5 percent, 1 percent, and 0.1 percent levels become 1.67, 2.39, and 3.23, respectively. 1. The t statistic is –2.86. Not affected. Reject H0 at the 1 percent level. 2. t = –1.71. Now we can reject at the 5 percent level. 3. t = 0.86. Fail to reject at the 5 percent level. 4. t = 2.86. Here there is a problem because the coefficient has the unexpected sign and is large enough to reject H0 at the 1 percent level with a two-sided test. In principle we should stick to our guns and fail to reject H0. However we should consider two further possibilities. One is that the justification for a one-sided test is incorrect (not very likely in this case). The other is that the model is misspecified in some way and the misspecification is responsible for the unexpected sign. For example, the coefficient might be distorted by omitted variable bias, to be discussed in Chapter 6.