

Econ 446  
Computer lab 10  
Topics, nonlinear relationships

In today's class, you need to know what the difference between qualitative and quantitative variables. You need to know how the dummy variable affects the model interpretation. You need to know how to model qualitative factors with more than two categories and you need to learn the dummy variable trap.

7.7

The model is

$$\ln(SAL1) = \beta_1 + \beta_2 APR1 + \beta_3 APR2 + \beta_4 APR3 + \beta_5 DISP + \beta_6 DISPAD + e$$

a)

Estimate the log linear model.

```
generate float lnSal1 = ln(sal1)  
regress lnSal1 apr1 apr2 apr3 disp dispad
```

b)

Discuss and interpret the estimates of  $\beta_2$ ,  $\beta_3$ ,  $\beta_4$ .

c)

Are the signs and relative magnitudes of the estimates of  $\beta_5$  and  $\beta_6$  consistent with economic logic? Interpret these estimates using the approaches in sections 7.5.1a and 7.5.1b.

You need look at page 185 in the textbook for explanation.

d)

Test, at the 5% level of significance, each of the following hypothesis:

i),

$$H_0: \beta_5 = 0$$

$$H_1: \beta_5 \neq 0$$

You can get the t statistics from the regression table since you are testing whether the coefficient is zero.

Or you can test it by t statistics, just use the following command:

```
scalar tttest=(_b[disp]-0)/_se[disp]  
scalar tc=invttail(46,0.025)  
scalar list
```

Or you can use the F test as we did in the last class.

ii)

$$H_0: \beta_6 = 0$$

$$H_1: \beta_6 \neq 0$$

This part is the same as part (i), you can use t test or F test.

$$\text{iii) } H_0: \beta_5 = 0, \beta_6 = 0$$

$$H_1: \beta_5 \text{ or } \beta_6 \neq 0$$

You can use the command

```
test ( disp dispad)
```

Or you can run the unrestricted model and get sseu, then run the restricted model and get sser, then calculate the F test according to formula. The command is:

```
scalar sseu=e(rss)
```

```

scalar df_unrest=e(df_r)
regress lnsal1 apr1 apr2 apr3
scalar sser=e(rss)
scalar df_rest=e(df_r)
scalar j=df_rest-df_unrest
scalar ftest=((s-ser-sseu)/j)/(sseu/df_unrest)
scalar fc=invFtail(j,df_unrest,0.05)
scalar list ftest fc

```

iv)

$$H_0: \beta_6 \leq \beta_5$$

$$H_1: \beta_6 > \beta_5$$

You can transform the above test as

$$H_0: \beta_6 - \beta_5 \leq 0$$

$$H_1: \beta_6 - \beta_5 > 0$$

You can test the above hypothesis by t test, the command is as follows:

```

matrix mycov=e(V)
scalar var_disp=e1(mycov,4,4)
scalar var_dispad=e1(mycov,5,5)
scalar cov_56=e1(mycov,5,4)
scalar mysd=sqrt(var_disp+var_dispad+2*cov_56)
scalar ttest=(_b[dispad]-_b[disp])/mysd
scalar tc=invttail(71,0.05)
scalar list tc ttest

```

e)

discuss the relevance of the hypothesis tests in (d) for the supermarket chain's executives.

7.8

The model is to investigate the pricing of compact disks.

a)

Estimate the model  $price = \beta_1 + \beta_2 age + \delta_{net} + e$ , interpret the estimated model.

```
regress price age net
```

b)

Estimate the model  $price = \beta_1 + \beta_2 old + \delta_{net} + e$ , interpret the estimated model.

```
regress price old net
```