
Homework 3

Due: Tuesday, October 27, 2015, 18:00 hours in class. Late homework will not be accepted.

Instruction: Answer all questions. Homework must be handwritten. Nevertheless, when asking to use Eviews, you have to answer by copying results from Eviews and pasting in Word from which you get a computer print-out. Credit will not be given to photocopying or duplication of files.

I. Consider the effect of various factors on salary. The data set `hw3_ceosal_excel` is in Excel form. The variables are defined as follows.

<i>salary</i>	1990 salary, thousands of dollars
<i>sales</i>	1990 firm sales, millions of dollars
<i>roe</i>	rate on equity in percent, average during 1989-90
<i>finance</i>	=1 if it is a financial firm
<i>consprod</i>	= 1 if it is a consumer product firm
<i>utility</i>	= 1 if it is a utility firm

The variables *finance*, *consprod*, and *utility* are binary variables. The omitted (benchmark) industry is transportation, denoted by *transport*. There are 209 observations. Our model of interest is

$$(I.1) \quad \log(\text{salary}) = \beta_0 + \beta_1 \log(\text{sales}) + \beta_2 \text{roe} + \delta_1 \text{finance} + \delta_2 \text{consprod} + \delta_3 \text{utility} + u$$

- Use Eviews to estimate equation (I.1). Report the estimation output in equation form. (Note that before using Eviews, check the Excel file for the *start and end observations*, *upper-left data all*, and *number of series*.)
- Interpret the coefficient on the variable *utility*. Compute the approximate percentage difference and exact percentage difference in estimated salary between the utility and transportation industries.
- What is the approximate percentage difference in estimated salary between the consumer products and finance industries? How would you redefine dummy variables? What is the benchmark group? Write an equation that would allow you to test whether the difference is statistically significant.
- In question 3, how do you obtain data values for *transport*. Use Eviews to estimate the equation derived from question 3 to test whether the difference is statistically significant at the 5% significance level.
- Use Eviews to test whether *finance* and *consprod* are redundant variables by the following methods:
 - F Test. What are the restricted and unrestricted models?
 - LR (log likelihood) Test. What are the restricted and unrestricted models?
 - LM (Lagrange Multiplier) Test. What are the restricted and unrestricted models?

II. Use the same data set as in question I to predict salary of CEO.

1. Find the mean prediction of $\log(\text{salary})$ when $\text{sales} = 6,000$ and $\text{roe} = 15$ for the finance firm. Find the predicted value of salary by taking antilog. (Note that “log” used in our application is the logarithm of base e, not of base 10. In case that you use Excel to calculate the predicted value, “log” in Excel uses base 10 and “ln” in Excel uses base e.)
2. With an aid of Eviews, find the predicted value of salary using the preferred method of predicting salary when $\log(\text{salary})$ is the dependent variable. Interpret.
3. Find a 95% confidence interval of the predicted value of $\log(\text{salary})$. Interpret.
4. Let $\log(\text{salary}^0)$ be the unknown $\log(\text{salary})$ of CEO of the finance firm with $\text{sales} = 6,000$ and $\text{roe} = 15$. Use Eviews to obtain relevant information to find a 95% confidence interval for $\log(\text{salary}^0)$. Interpret and comment on the width of this confidence interval.

III. Using the same data set, consider the following model in level form,

$$(III.1) \text{ salary} = \beta_0 + \beta_1 \text{sales} + \beta_2 \text{roe} + \delta_1 \text{finance} + \delta_2 \text{consprod} + \delta_3 \text{utility} + u$$

1. Use Eviews to estimate the level equation (III.1). Report the estimation output in equation form.
2. Compare R-squared in the estimation outputs of equation (I.1) and (III.1). Which model do you prefer?
3. For explaining variation in salary , decide whether you prefer model (I.1) in log form or Model (III.1) in level form.