

Due in class Thursday, October 8
(25 points)

The data for this assignment are contained in both the Excel file 'ceosal2.xls' and the STATA file 'ceosal2.dta' available at <http://u.arizona.edu/~rlo>. These data pertain to a sample of 177 CEO's in 1990. Be sure to attach the supporting computer print out to the completed assignment, show your work, and make clear where your answers are shown.

The variables of interest for this exercise are *salary* (annual salary in \$1,000's), *ceoten* (years as a CEO with the company), *mktval* (market value of the firm at the end of the year in millions), and *sales* (firm sales/revenues in millions).

Some basic STATA commands that might be useful

To estimate a regression model without a constant term, e.g

$Y_i = \beta_1 X_{1i} + \beta_2 X_{2i} + u_i$, type the command **regress Y X1 X2, noconstant**.

To generate the mean of a variable Y , type the command **egen Ybar = mean(Y)**

What this command does is to calculate a variable $Ybar$ for which every observation is the sample mean of the variable Y .

To create a dummy (indicator) variable that assumes the value 1 when a variable X_i exceeds some value c , type the command **generate Xdummy = X > c**

What this command does is to create a variable named $Xdummy$ that takes on the value 1 whenever $X_i > c$, and equals 0 otherwise.

1. Use *OLS* to estimate the salary model $S_i = \beta_0 + \beta_1 R_i + \beta_2 Val_i + \beta_3 TD_i + u_i$, $i = 1, \dots, 177$ (where S is *salary*, R is *sales*, Val is *mktval*, and TD is a dummy variable that takes on the value 1 when a CEO has more than 6 years tenure as CEO with a company and 0 otherwise).
 - a. Determine how much difference it makes in salary if a CEO has more than 6 years tenure compared with having less than 6 years tenure. .
 - b. Estimate the salary model in deviation form, i.e. regress y_i on x_{1i} , x_{2i} , and x_{3i} , where $y_i = S_i - \bar{S}$, $x_{1i} = R_i - \bar{R}$, $x_{2i} = Val_i - \bar{Val}$, $x_{3i} = TD_i - \bar{TD}$, and \bar{S} , \bar{R} , \bar{Val} , and \bar{TD} are the sample means of S_i , R_i , Val_i , and TD_i .
 - c. Estimate the salary model in deviation form again but this time without a constant term included.
 - d. Compare your estimated coefficients $\hat{\beta}_1$, $\hat{\beta}_2$, and $\hat{\beta}_3$ and their associated standard errors (or 't' values) between the original salary model and the model in deviation form both with and without a constant term. When are these values identical, and when are they different? Explain.

2. Auxiliary regressions (remember to include the constant term)
 - a. Let \hat{v}_{1i} represent the residuals from the auxiliary regression of R_i on Val_i , and TD_i . Regress S_i on \hat{v}_{1i} and explain what the resulting coefficient estimates represent.
 - b. Let \hat{v}_{2i} represent the residuals from the auxiliary regression of Val_i on R_i , and TD_i . Regress S_i on \hat{v}_{2i} and explain what the resulting coefficient estimates represent.
 - c. Let \hat{v}_{3i} represent the residuals from the auxiliary regression of TD_i on R_i and Val_i . Regress S_i on \hat{v}_{3i} and explain what the resulting coefficient estimates represent.
3. The estimated standard errors of $\hat{\beta}_1$, $\hat{\beta}_2$, and $\hat{\beta}_3$ in the multiple regression salary model can be related to the estimated standard error of the regression and the sum of squared residuals from the appropriate auxiliary regression. Use this formula to calculate the estimated standard errors of $\hat{\beta}_1$, $\hat{\beta}_2$, and $\hat{\beta}_3$ and compare your calculations with those obtained directly from the multiple regression results for the salary model.