Introductory Econometrics

Tutorial 8

PART A: To prepare for this week's quiz review the lecture slides for Topic 7 and Chapter 6.2 (a), (b) and (c), of the textbook.

Part B: This part will be covered in the tutorial. You are encouraged to attempt these questions before the tutorial.

1. The file vote1.wf1 contains data on election outcomes and campaign expenditures for 173 two-party competitive races (the two major political parties in the US are Democrats and Republicans, and competitive seats are non-safe seats in which prior to the election no party could be confident that their candidate will win. In Australia, the unsafe seats are called "marginal seats") for the House of Representatives (the "lower house" of the US Congress) in 1988. There are many variables in this data set, but the ones that we are going to use in this exercise are:

$VOTA$	% vote received by Candidate A
$EXPENDA$	Candidate A's campaign expenditure in 1000 dollars
$EXPENDB$	Candidate B's campaign expenditure in 1000 dollars
$DEMOCA$	Dummy variable =1 if Candidate A was a democrat, 0 otherwise

   In each race, Candidate A is the candidate whose last name starts with a letter that is alphabetically above the first letter of the last name of the other candidate. Run a regression of $VOTA$ on a constant $\log(EXPENDA)$, $\log(EXPENDB)$ and $DEMOCA$.

   (a) (*Interpreting the regression results when explanatory variables are logarithms of original variables and also interpreting the coefficient of dummy variables*): Explain what each parameter estimate shows.

   (b) (*Test of the overall significance of a regression*): Test the overall significance of the model at the 1% level of significance (ignore the fact that Eviews produces the F statistic, compute it using the R^2). Explain in words the hypothesis that you are testing.

   (c) (*Test of significance of an explanatory variable*): Test the hypothesis that controlling for campaign expenditure, being a democratic candidate is not significant in predicting the % vote received in competitive races at the 5% level of significance. Perform the test by two methods: (i) by comparing the t statistic with the appropriate critical value, and (ii) by using the p-value.

   (d) (*Joint test of multiple linear restrictions*): Test the joint hypothesis that controlling for campaign expenditure, being a democratic candidate does not contribute to the % vote received **and** that the effect of every percentage increase in campaign expenditure by Candidate A can be offset exactly by the same percentage increase in the opponent's campaign expenditure. Perform this test at the 5% level of significance. (*Note: the thinking part in these questions is to work out what the restricted regression should be. Exclusion restrictions are easy because we just drop the variables that are hypothesised to not contribute to explaining the dependent variable. Other restrictions, such as $\beta_2 = -\beta_1$ needs forming a linear combination of variables. The advantage of eviews is that it does not require these combinations to be generated as new variables and then entered into a regression. For example, the restricted model for this hypothesis can be estimated by entering "vota c (log(expenda)-log(expendb))" is the equation window.*)

(e) (Testing a single hypothesis about a linear combination of parameters) Drop $DEMOCA$ from the model. In close races each candidate believes that he or she needs to increase their campaign expenditure by more than 1% to offset the effect of a 1% increase in their opponent's expenditure. The null hypothesis is $\beta_1 + \beta_2 = 0$, and although it involves two parameters, it tests only one restriction. The alternative is $\beta_1 + \beta_2 < 0$, so we cannot use the F test because F test provides inference against $\beta_1 + \beta_2 \neq 0$. In such cases that we have only one restriction about a linear combination, we use a reparameterisation trick: Define $\delta = \beta_1 + \beta_2 \Longrightarrow \beta_2 = \delta - \beta_1$. Substitute for β_2 in the population model and re-arrange, you will see that δ becomes the coefficient of one of the explanatory variables in the reparameterised model. You can see that testing $\delta = 0$ against $\delta < 0$ can be performed with a simple t test in this reparameterised model. Magic!

Eviews commands to calculate critical values:

- Example: To get the 5 percent one tail critical value of the t-distribution with 30 degrees of freedom, enter `scalar cvt30_5 = @qtdist(0.95,30)`. The critical value is recorded in a scalar variable that we called "cvt30_5". This name is of course your choice and can be anything.
- Example: To get the 5 percent critical value of the F-distribution with 2 and 169 degrees of freedom, enter `scalar cvf2_169_5 = @qfdist(0.95,2,169)`. The critical value is recorded in a scalar variable that we called "cvf2_169_5". This name is of course your choice and can be anything.
- All statistical programs are capable of giving you these critical values, even spreadsheet programs like Excel. Unless you use these commands everyday, you will forget them, but you know that you can always find them using the "help" facility of each program. See if you can find these commands in Eviews help.