Economics 471: Econometrics

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Problem Set #4

1. Are rent rates influenced by the student population in a college town? Let $rent$ be the average monthly rent paid on rental units in a college town in the United States. Let pop denote the total city population, $avginc$ the average city income, and $pctstu$ the percentage of students in the total population. One model to test for a relationship is

$$\ln(rent) = \alpha + \beta_1 \ln(pop) + \beta_2 \ln(avginc) + \beta_3 pctstu + u$$

   (a) State the null hypothesis that size of the student body relative to the population has no ceteris paribus effect on monthly rents. State the alternative that there is an effect.

   (b) What signs do you expect for β_1 and β_2?

   (c) The equation estimated using 1990 data from RENTAL.RAW for 64 college towns is

$$\ln\widehat{(rent)} = 0.043 + 0.066 \ln(pop) + 0.507 \ln(avginc) + 0.0056 * pctstu$$

   Replicate the results. What is wrong with the statement: "A 10% increase in population is associated with about a 6.6% increase in rent"?

   (d) Test the hypothesis stated in part (a) at the 1% level.

2. The following model can be used to study whether campaign expenditures affect election outcomes

$$voteA = \alpha + \beta_1 \ln(expendA) + \beta_2 \ln(expendB) + \beta_3 prtystrA + u$$

   where $voteA$ is the percentage of votes received by Candidate A, $expendA$ and $expendB$ are campaign expenditures by each candidate and $prtstrA$ is a measure of party strength for Candidate A.

   (a) What is the interpretation of β_1?

   (b) In terms of the parameters, state the null hypothesis that a 1% increase in A's expenditures is offset by a 1% increase in B's expenditures.

   (c) Estimate the model using the data in VOTE1.RAW and report the results in usual form. Do A's expenditures affect the outcome? What about B's expenditures? Can you use these results to test the hypothesis in part (b)?

   (d) Estimate a model that directly gives the t-statistic for testing the hypothesis in part (b). What do you conclude (use a two-sided alternative)?