ECON 3161 Homework 4 (Fall 2021)

Due Date: Nov 12 (by the end of the day)

Instruction: There are 60 points in total. This homework needs computer coding. Stata software is recommended, but you can use other software you prefer. Please copy and paste your code to the end of your answer file. Then upload your answer file on canvas.

The following model is used to study whether campaign expenditures affect election outcomes:

$$voteA = \beta_0 + \beta_1 log(expendA) + \beta_2 log(expendB) + \beta_3 prtystrA + u, \tag{1}$$

where $voteA$ is the percentage of the vote received by Candidate A, $expendA$ and $expendB$ are campaign expenditures by candidates A and B, and $prtystrA$ is a measure of party strength for candidate A (the percentage of the most recent presidential vote that went to A's party). Answer the following questions:

1. (5 pts) What is the interpretation of β_1?

2. (8 pts) Find the p-value for the test $H_0 : \beta_1 = 0$ against $H_a : \beta_1 \neq 0$. Do you reject the H_0 at the 1% significance level? (Hint: you can look at the p-value in the regression output or use $test$ command in stata to do the test. More detail about the $test$ command can be found here: https://www.stata.com/manuals13/rtest.pdf. You can look at the examples on page 5–8.)

3. (5 pts) Give the 95% confidence interval for β_3. (Hint: this can be seen from the regression output)

4. (5 pts) 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.

5. (5 pts) Estimate a model that directly give the t statistic for testing the hypothesis in question 4. What do you conclude? (Use a two-sided alternative and 5% significance level. Hint: this is a test of a single linear combination of the parameters.)

6. Now suppose you want to test if candidate A's expenditure, candidate B's expenditures and the party strength jointly statistically significant, answer the following questions:

(a) (5 pts) what test will you use?

(b) (6 pts) Write down your null hypothesis and alternative hypothesis.

(c) (8 pts) Write down your restricted and unrestricted models.

(d) (8 pts) Write down your test statistic. What is the distribution of the test statistic?

(e) (5 pts) Conduct your test. Will you reject the H_0 at 5% significance level? (Hint: you can look at the p-value in the regression output or use *test* command in stata to do the test.)