POL 345: Quantitative Analysis and Politics

Precept 9

Week 11

1 Social Pressure Experiment

We return to the social pressure voting example discussed at the beginning of the course. Recall that in the 2006 Michigan August primary, researchers used the public voting records to test whether social pressure of seeing your or your neighbors' voting records would pressure individuals to vote. A random sample of registered voters who had voted in the 2004 general election were randomly assigned to the control group and one of three treatment groups. Voters in the treatment group received a post card showing their own and their neighbors' voting records. Voters in the control group did not receive any card. To determine whether the treatment increased turnout, we conduct a hypothesis test comparing the behavior of voters in the control group and the behavior of voters in the treatment group. The `social.txt` data set contains the variables `voted` (an indicator of whether or not the individual voted) and `treatment` (specifying the group to which the individual was randomly assigned).

1. Conduct a one-sided, two-sample hypothesis test where the null hypothesis is that the average treatment effect is zero. Use 5% significance level. Briefly discuss the results.

2. Next, estimate the average treatment effect and compute 95% confidence interval. Briefly interpret the results.

3. Finally, compute the power of the hypothesis test conducted above under the following scenario. Assume that the size of the treatment group is equal to that of the treatment group in the experiment. Use the same sample size for the control group. Also, suppose that the proportion that voted in the treatment group is 0.4 and the proportion that voted in the control group is 0.3.

2 Mexican Universal Health Care Insurance Experiment

Here, we analyze the data from the randomized evaluation study of the Mexican universal health care insurance. The study employed the matched-pair design where two clusters of households were paired based on the similarity of background characteristics. Then, within each pair, the treatment (i.e., the encouragement to receive the universal health care insurance) was randomized whereas the outcome was the proportion of households who experienced the catastrophic healthcare expenditure within each cluster. The data includes the sample proportions among the `treatment` and `control` households for each `pair`.

1. Assuming that the outcome follows a normal distribution, conduct a two-sided t-test (using `paired = TRUE` option in `t.test()`) to test whether the treatment was found to have an effect. Also, report the point estimate of the average treatment effect and the associated 95% confidence intervals. Give a brief interpretation.

2. Conduct the same analysis as above by using the normal approximation.

3. Using both the t-distribution and the normal approximation (calculated by hand), calculate the power of the hypothesis test above where the true proportion among treated households is assumed to be 0.08 and the true proportion among control households is assumed to be 0.10. Assume that the standard deviation of pairwise differences is the same across two groups and equals the sample standard deviation of pairwise differences.