**<EX1>Exercises: Chapter 13**

**<EXL, with nested EXSL elements, below>**

1. Middleton and Rogers report the results of an experiment in which ballot guides were mailed to randomly selected precincts in Oregon prior to the 2008 November election.[[1]](#footnote-1) The guides were designed to encourage voters to support certain ballot measures and oppose others. Load the example dataset from [web address]. The dataset contains election results for 65 precincts, each of which contains approximately 550 voters. The outcome measure is the number of net votes won by the sponsors of the guide across the four ballot measures that they endorsed or opposed. The treatment is scored 0 or 1, depending on whether the precinct was assigned to receive ballot guides. A prognostic covariate is the average share of the vote cast for Democratic candidates in 2006.
   1. Estimate the average treatment effect, and illustrate the relationship between treatment and outcomes graphically using an individual values plot.

. bys treatment: summ relevant

-> treatment = no

Variable | Obs Mean Std. Dev. Min Max

-------------+--------------------------------------------------------

relevant | 17 73.88235 292.9537 -521 574

-> treatment = yes

Variable | Obs Mean Std. Dev. Min Max

-------------+--------------------------------------------------------

relevant | 48 164.0833 248.7736 -244 888



* 1. Interpret the graph in part (a). The mean of the treatment observations (164) is higher than the mean of the control observations (74), suggesting that the the treatment led to 90 more Democratic votes per precinct. The amount of dispersion around the mean is similar in both groups.
  2. Use randomization inference to test whether the apparent difference-in-means could have occurred by chance under the sharp null hypothesis of no treatment effect for any precinct. Interpret the results. A one-tailed test is appropriate here given that the campaign sought to increase its votes. Randomization inference applied to 10,000 simulated randomizations shows that one-tailed p-value of the estimated ATE is 0.116. This figure is close to but short of the conventional 0.05 threshhold.
  3. Suppose it were the case that when randomly assigning precincts, the authors used the following screening procedure: no random allocation was acceptable unless the average 2006 Democratic support score in the treatment group was within 0.5 percentage points of the average 2006 Democratic support score in the control group. Does this restriction change the probability that each observation is assigned to the treatment group? If so, re-estimate the ATE using inverse probability weights. (See Chapters 3 and 4.) Restricted randomization changes the probabilities that each unit enters into treatment. Here is the distribution of probabilities:

> summary(probs)

Min. 1st Qu. Median Mean 3rd Qu. Max.

0.6546 0.7046 0.7321 0.7385 0.7737 0.8124

Our estimation procedure must reweight the data using inverse probability weights. The IPW estimate of the ATE is 136.1.

* 1. Redo your hypothesis test in part (c) subject to this restriction on the randomization. Interpret the results. Randomization inference applied to 10,000 simulated “restricted” randomizations shows that one-tailed p-value of the estimated ATE is 0.005. This figure allows us to decisively reject the null hypothesis at the conventional 0.05 threshhold. The p-value here is lower than when we assume unrestricted randomization for two reasons: the estimated ATE is larger, and the standard error of the sampling distribution is smaller.

1. Select a published article that presents the design and analysis of a field experiment. Based on the publication and any supplementary materials provided by the authors, try to fill in as much of the reporting checklist for research articles as you can. What pieces of information, if any, went unreported? Does the failure to address one or more items on the checklist affect the confidence that you place in the results they report?
2. Conduct your own randomized experiment, based on one of the suggested topics in Appendix B.
   1. Compose a planning document.
   2. Take an online research ethics course, and obtain your certification to conduct human subjects research. Obtain approval for your study from the institutional review board at your college or university.
   3. Conduct a small pilot study to work out any problems in administering the treatment or measuring outcomes.
   4. Conduct the experiment. Construct a data file and supporting metadata.

Compose a research report.

1. Middleton and Rogers 2010. [↑](#footnote-ref-1)