

Assignment #5
MACS 30000, Dr. Evans
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1. a) I searched the word “experiment” in HITs, and I found the research by Alex Shaw for academic research purposes.

b) Each participant will be awarded for \$0.75 if they complete the study and upload a screenshot of that website as an evidence for completion. However, it is required for all participants to answer the two initial screener questions, if one cannot be deemed eligible for the two initial questions, then he or she will not be paid.

c) Their qualification includes: 1) the participant has to live in the US; 2) the participant should have a HIT approval rate of less than 95%; and 3) he or she has to be deemed as eligible by the two initial screener questions.

d) The time provided by experimenters to complete the task is 30 minutes, and the implied hourly rate should be about \$1.5/hour.

e) The job will be expired in 7 days from the Sunday, 11/11/2018, on 11/18/2018.

f) It would cost the experimenter $1,000,000 \times 0.75 = 750,000$ dollars.

2.

The paper by Costa and Kahn (2013) focused on the main research question: how could political/environmental ideology (liberal or conservative) mediate the effectiveness of energy conservation “nudges”, which, specifically, is the report sent by electric utility companies to households to encourage reducing electricity consumption (5).

To test their hypotheses, the authors used two data sources and matched the two for further regression analysis. One data source is the 2-year residential billing data from 2007 to 2009. It consists of the electricity usage per billing cycle (in kilowatt hours), how many days a billing cycle has, whether the house uses electric heat and whether the household subscribes to the electric utility’s program, which implies its purchased energy comes from renewable sources

(10). The second data source comes from HER (Home Energy Reports), which indicates whether and when a household receives reports, the size (in square feet) of the house, whether it heats with electricity or gas, and the age of the house (10). The authors also purchased data from www.aristotle.com (10) to obtain information about voter registration and marketing for March 2009 to analyze individuals' party affiliation, whether they donate to environmental organizations or not (10).

The authors compared the treatment and the controlled group for analysis. The controlled group has 49,000 households who have never received reports from HER while the treatment group receives or has received HERs before (3). HER (Home Energy Report) acts as a treatment with 35,000 households in this study. HER is a report sent to each household in the treatment group, which gives a house information about the monthly electricity usage, tracks the usage over time, and compares the usage with their neighbors' over time (3). The report also provides tips for saving energy and a message that comments on their performance. Therefore, the reports inform households about two important messages: their absolute usage of energy and their comparative consumptions in relation to their neighbors.

While Schultz et al. (2007) mainly aimed to investigate the effect of normative and injunctive messages on their participants' energy consumption, Costa and Kahn (2013) went one step further to study whether such "nudge" effect might be mediated by individual household's ideology. Therefore, Costa and Kahn (2013) were more careful in confining types of households that should be controlled and should be included or excluded from the field experiment. They included only single-family homes and non-apartment houses that are between 250 and 99,998 square feet (6). A reason for having this extra layer of control, I suppose, is to eliminate the

effect of factors other than the household's political and environmental ideology that might change participants' consumption. For example, single-family homes could differ from multiple-family homes because it is easier for single-family homes to consent on an ideology and also on how to consume energy. Similarly, apartment residents could be different from house residents in how they perceive the importance of saving energy.

Finally, the researchers found that “nudges” by the HER could be more effective in reducing household energy consumption if the household is more liberal. In addition, liberal households are also less likely to opt out of the regular reports than conservative households. After controlling for the age of the house and taking into account other environmental-related behaviors such as the enrollment of renewable energy programs, this relationship remains statistically significant between liberals and conservatives.

3. a) Because we have a budget constraint of \$1000, 150 clinics and each with 600 eligible patients, we could definitely work with more than 2 clinics. When only 2 clinics are used, 1200 patients could participate, and 600 messages in maximum could be sent. In that case, only $2 \times 100 + 600 \times 1 = 800$ dollars will be used in maximum, which will certainly not be optimum for researchers as we still have \$200 budget left. Thus, we should consider scenarios with more than 2 clinics participated in the experiment.

First of all, whether the resources should be focused or spread should be dependent on the research question that this study is focused on. For example, if the purpose of the experiment, though unlikely, is to test the effectiveness of text message reminders in a small neighborhood, then it is better to select only a few (3 or 4) clinics rather than to spread the money to many clinics. The reason for not choosing only 1 clinic is that even the targeted population is within a small neighborhood, the clinic still might not be representative enough.

Therefore, another factor that decides whether to spread resources would be the representativeness of the clinic patient population to the targeted population. If the experiment aims to estimate the effect in a city, and most clinics in the city have patients from all socioeconomic, racial, age, and educational backgrounds, then we could reasonably limit the number of clinics while trying to spend the money in sending more messages per clinic.

Therefore, we could have 3-4 clinics (\$300-400 fixed cost) and get more participants involved (around 233 participants in controlled or treatment for each of the 3 clinics, or around 150 in each group per clinic when 4 participates). However, if clinics in this area tend to be more specialized, for example, some are pediatric clinics that serves only one age group or clinics that have the majority of their patients as from one racial or socioeconomic group, then it is better to spread to more clinics (6-8) to make sure that members from each social group could be included in this experiment.

Similarly, whether to spread or to focus resources also depends on the community that is aimed to study. If the city has generally segregated communities in terms of race, education, age, and socioeconomic status, then researchers could strategically select clinics from a diverse range of communities to make sure the representativeness of their sample to the city's general population. In this case, whether to spread or to focus resources depends on how many of those segregated communities the city has and how segregated or how different they are among themselves. On the other hand, if the city does not have segregated communities, then researchers should pay more attention to the characteristics of patients going to the clinics. Like mentioned in the previous paragraph, whether a particular clinic has a diverse patient population or a more homogeneous population.

More importantly, the resources should be allocated in order to ensure there is no spillover effect and no hidden treatment effect. The spillover effect (Salganik, 206) occurs when a treated member divulges the information about the treatment to a member of the controlled group and, in turn, treat him or her. Therefore, if clinics in the area generally have patients who tend to know each other (e.g., they are neighbors, friends, co-workers or family members), then it is better to spread to more clinics (7-8) and include fewer patients (84-50) per clinic to mitigate the possible spillover effect. Similarly, the hidden treatment effect occurs when a treated person behaves in a certain way while such behavior is not influenced by the treatment itself but by other outcomes that caused by the treatment (Salganik, 207). For example, if we find that working with certain clinics and ask them to send text messages actually promotes them to advertise through text messages more often, which further treats our treatment group, then it is better to spread resources to more clinics because it is unlikely that all clinics would respond the same.

In a word, the purpose to focus or to spread resources is to ensure that the experiment has a good external validity, which indicates that its results could be generalized to the target population they hope to study.

b) As suggested by Salganik (208-209), using a difference-of-difference approach could give a smaller standard error (eq. 4.9 in Salganik) and, thus, a smaller detectable smallest effect size. In this case, if we are only comparing the mean vaccination uptake rates between the controlled group and the treatment group, then we are using a difference-of-means approach, and the

smallest effect size could be larger. On the other hand, if we are able to get access to the data from previous years and using it as another controlled group for comparison, we will be able to use the difference-of-difference estimator to reduce the smallest effect size. This approach would provide us with a higher precision and indirectly expand our sample size. Moreover, it could enable us to see that if there is a difference across the years.