Assignment 3: Rocket Fuel Case Analysis

Please read the "Rocket Fuel" case study (HBS online course packet) that describes the company, the experiment and the data available. This case analyzes data from an online advertising experiment to determine whether the campaign was profitable or not, and how to optimize an advertising campaign. This assignment is complementary to the discussion in class.

Download the data Excel file named "rocketfuel_data.csv" available on Canvas. Use Excel or R for all of your analyses.

Learning Objectives

1. Get hands-on experience with online advertising data.
2. Perform effectiveness and ROI analysis.
3. Identify pitfalls in common analysis methods.

*** **Provide detailed explanation for your answers to get full credits.** ***

Q1. (3 points)
A common issue with online experiments is that users were not properly randomized into test and control groups.
(a) Calculate the share of users allocated to the control group and report it. Please use 6 decimals after the point.
(b) How would you test for whether or not the campaign properly randomized consumers into the test and control group? Perform this test and write down your conclusions.
(c) Why is randomization important?

Hints for part (b):
- If the experiment was properly randomized, what would be the average number of ad impressions per user in each group?
- Don't forget to test your conclusions for statistical significance. Take a look at the T.TEST function in Excel and think about whether a two-sided or a one-sided test is more appropriate for this task.
- Report the results (p-value) from the statistical test you performed and interpret it.

Q2. (2 points)
Was the campaign effective in increasing conversion rates? Compare the conversion rates between test and control groups and run (and report) the proper statistical test results.

Q3. (5 points)
Was the campaign profitable?
(a) How much more money did TaskBella make by running the ad campaign?
(b) What was the cost of the campaign?
(c) Calculate the ROI (i.e. Return on Investment) from the campaign.
(d) Was it worthwhile to use a control group? Could it have been smaller? Why or why not?

Q4. (5 points)
How did the number of impressions seen by each user influence the effectiveness of advertising?
(a) Create and attach as exhibit (i.e. graph) a bar chart of conversion rates as a function of the number of ads displayed to consumers.
(b) Is there a frequency effect to advertising, i.e. does showing more ads increase the probability of conversion?

Hints for part (a) and (b):
- The chart will have conversion rates on the Y axis. The X axis will have bins (groups/categories) with values 0-9, 10-19, etc. up to 190-199 and 200 and above. There will be two bars (with different colors for illustration) per bin: a bar for the control group and a bar for the test group.
- To answer part (b), focus on the difference between the bars for the test and control groups. Keep in mind that “correlation does not imply causation.”

Submission guidelines

- Submit via Canvas, 9PM EST on the day of class 5
  - Late submissions will be penalized
  - Late corrections will not be accepted

- Note that assignments are automatically checked for similarity—it is ok to discuss with other students, it is not ok to copy

- Submit **two** files (one submission per individual):

1. Slide Deck

   - In the slide deck, I expect you to answer each question in an executive way – you need to clearly describe the question, analysis procedures, rationales behind key steps, as well as the results you obtained.
   - Please include screenshots of the R command lines or excel formula in your slide deck to demonstrate your key steps.
   - Use as many slides as you need.
   - The title page must include your name.
   - If you have worked/discussed with someone else, please also include their name(s) in a separate line on the title page.

2. Excel and/or R script file containing the codes that you used for your analysis.

   - Include comments in the script to help the TA follow your procedures.
   - The script file should be understood as a companion. Your TAs may go back and double check that your answers in the ppt are well supported.