MKT 436(R) - Homework 1 Solution

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Question 1:

This means that when advertising in the pre-treatment period, the average log-revenue of a DMA was 10.95. Alternatively, the average revenue from a DMA was approximately fifty-seven thousand dollars.

Critiera:

- Correctly specifying that this represents log-revenue, or a revenue of roughly 56,877.
- Correctly specifying that this is before the treatment is applied, or when ads were active.

Question 2:

The confidence interval for the intercept is 10.95 +/- .03, or (10.92, 10.98). This means that when advertising in the pre-treatment period, the plausible range for average log-revenue of a DMA was between 10.92 and 10.98.

Criteria:

- Correctly specifying the confidence interval, either in terms of log-revenue or revenue.
- Correctly specifying that the interpretation of the confidence interval is the plausible range, or something similar.

Question 3: The coefficient estimates imply that the presence of advertising increases revenue by roughly 4%. While the data rejects the notion that advertising has no effect, the confidence interval shows that ads might plausibly increase revenue by anywhere from .1% to 8%.

Criteria:

- Ensure the response references the correct coefficient value or range.
- The response should mention the effectiveness or impact of advertising.
- The response should mention statistical uncertainty, such as confidence intervals, p-values.

Question 4: The randomization check ensures that the treatment group and control group are similar before the treatment is applied. If they are, then any observed differences must be due to the treatment effect. The analysis shows that there is no statistically significance difference between the two groups, meaning that the notion that there is no difference between the two is plausible.

- The response should correctly identify that the purpose of the randomization check is to ensure that the treatment and control groups are similar before the treatment is applied.
- The response should correctly say the randomization check passed because there is no significant difference detected.

Question 5: The coefficient estimates imply that the presence of advertising increases revenue by roughly .7%. Since we can't reject the null hypothesis, it is plausible that advertising has no effect. However, because of the size of the standard error, advertising could still plausibly increase revenue by as much as 3%.

Criteria:

- Ensure the response references the correct coefficient value or range.

- The response should mention the effectiveness or impact of advertising.

- The response should mention statistical uncertainty, such as confidence intervals, p-values.

Question 6: Analysis A looked at how revenue changed in treatment dmas after advertising was turned off in a particular month. Any observed change in revenue could be due to advertising, or could be due to other things that changed over time. The control group allows us to observe what expected revenue would have been in the treatment period, had advertising been maintained.

Criteria:

- The response should correctly identify factors that vary over time. This includes seasonality, shopping habits, weather, the economic conditions, or just stating it may be due to changes over time.

- Do not mention factors that do not vary over time. This includes things like the city, or the DMA.

Question 7: The R-Squared is 8.422e-06, but it doesn't matter because this is a randomized experiment.

Additional Detail: The R-Squared does not affect the interpretation or confidence in our results. While a low R-Squared implies our control variables do not explain a large part of the variance, they need only explain the difference between the treatment and control group in the experiment. This is indicated by the standard error. As a whole, even important omitted variables do not bias the results of an A/B test.

Criteria:

- Correctly identify the R-Squared value from the regression in Analysis C.

- Correctly identify that the R-Squared value does not affect the interpretation or confidence in the estimated effectiveness of advertising.

Question 8: This experiment only looked at E-Bay's advertising on its own keyword in search engine results. The results may not generalize to advertising on other keywords, or advertising in other contexts.

Criteria:

- The response should identify specific limitations of the experimental design, such as its focus solely on eBay's own keywords or advertising in search engine results.

- The response should identify how these limitations might affect the generalizability of the results to other advertising campaigns or contexts.

Question 9: Based on this analysis, E-Bay should not advertise on their own keyword, as we have no evidence that it increases revenue, and ads are costly. The confidence interval in Analysis C is reasonably small, and rejects large, positive values of advertising.

Criteria:

- The response should clearly recommend that eBay avoid advertising on their own keyword.

- The response should justify the recommendation with evidence from the data, such as mentioning the confidence interval in Analysis C or the lack of a substantial positive effect on revenue.