TBR+Matched Markets -- Post Analysis Colab Guide

Authors: Marco Longfils

The purpose of this document is to guide you step by step in using Time Based Regression to analyze a geo experiment. For a general introduction to TBR and MM, please refer to the TBR paper, the MM paper, and this introduction to geo experiments. The colab can be found here.

Datasets needed to run the Colab

experiment_table:

Description: this table is the table containing the response and spend data at the geo level and at daily/weekly frequency. The table should be specified in the colab by using the URL of the Google Sheet.

Format: Google Sheet containing the following mandatory columns: date, response, cost, geo, assignment (1=Treatment, 0=Control). Any additional column is ok.

Example: here

Cell by cell description of the colab

Data Input

Cell 1

[View in colab]

Description: This cell will install and load the necessary libraries for the TBR analysis and it will load the data in input.

Action needed: Before running the first cell, make sure to update the Google Sheet url.

Analysis of the experiment with TBR

Cell 2

[View in colab]

Description: Select the parameters of the experiment. Briefly, we need to specify three time periods by specifying their start and end dates, which will be used for different purposes:
1) **Test period**: period of time in which the experiment was run.
2) **Pretest period**: period of time to use to fit the regression model.
3) **Cooldown period**: cooldown period after the conclusion of the experiment, typically two weeks.

- **pretest_start_date** indicates the first day in the pretest period.
- **pretest_end_date** indicates the last day in the pretest period.
- **test_start_date** indicates the first day in the test period.
- **test_end_date** indicates the last day in the test period.
- **cooldown_end_date** indicates the last day in the cooldown period.

- **average_order_value** is the mean value in dollars that the client attributes to a transaction/visit/contract. Use a value of 1 if the experiment is based on sales/revenue or an actual average order value (e.g. 80$) for an experiment based on transactions/footfall/contracts. The default value is 1. N.B.: make sure to use a value of 1 if the response variable of interest is revenue/sales. The analysis is still performed on transactions/visits/contracts and we only convert the iROAS estimate using the average order value.

Action needed: update the value of the parameters to the desired levels and run. The output of this cell contains some summary statistics for the treatment and control group during the pretest and test. In particular, check that the total response and cost for the two groups match with the checksums provided by the client during the test period, as shown in the following figure

Total cost: 50K
Total response and cost by period and group

| period	assignment	response	cost
Pretest	Control	1007853.6599999991	0
Pretest	Treatment	989838.7899999993	0
Test	Control	859005.300000001	0
Test	Treatment	994276.3999999986	49999.999999999985

Show 10 ▾ per page

Cell 3

[View in colab]

Description: aggregated (treatment vs control) time series plot of the response and cost variables. The title of each tab indicates which metric (response or cost) is shown. The experiment period is enclosed in the two vertical black (solid) lines, the design period in the two vertical red lines, and the end of the cooldown period is indicated by the dashed vertical black line.

Response
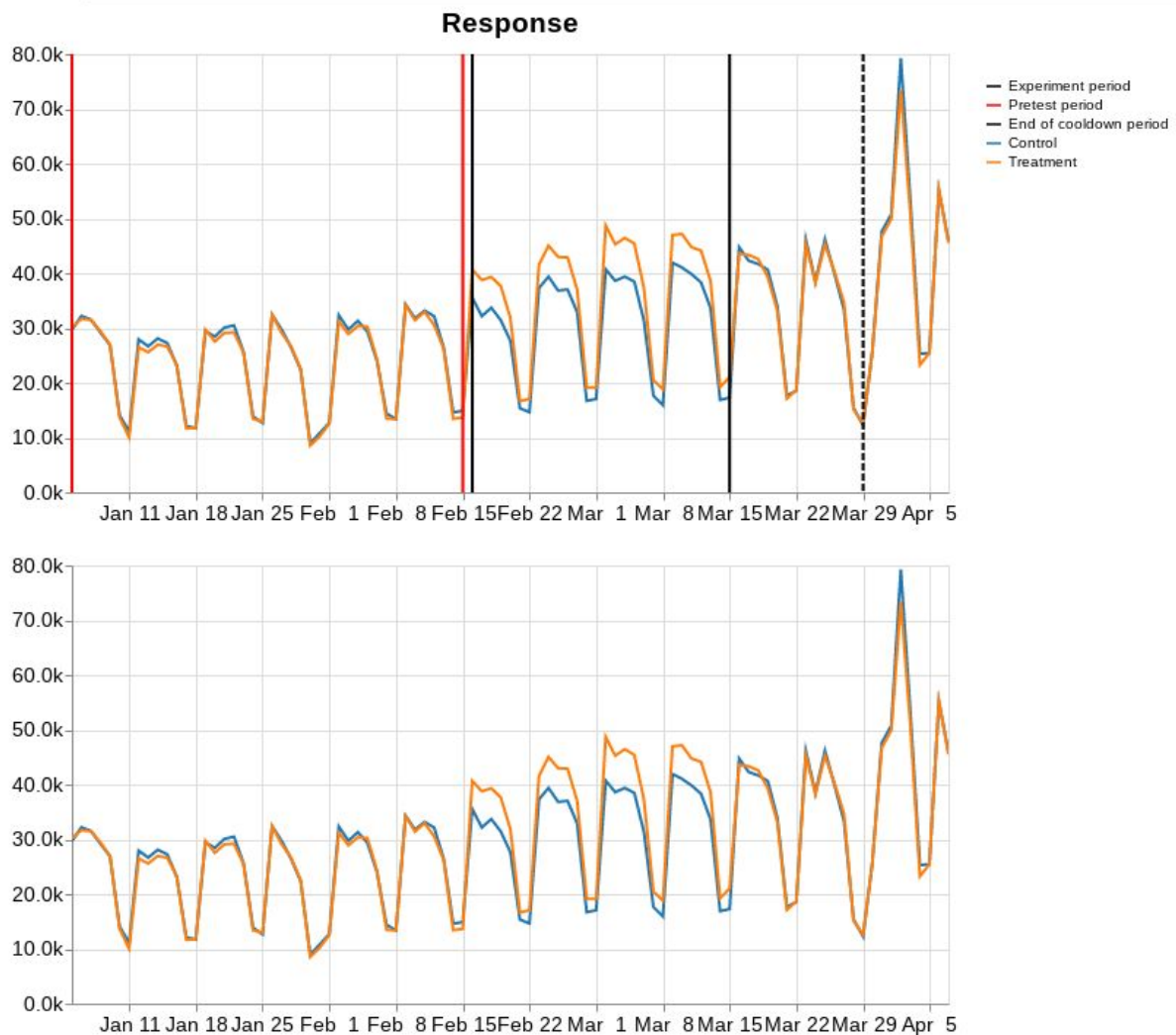
The plot is interactive:

- If you move the cursor on a point on the time series, we will show the value and the day for that point.
- If you select a time window on the top plot, we will show a zoomed in version of the plot in the bottom figure, see below.
- Once a time window is selected, you can shift forward or backward the window by drag and drop.
- Once a time window is selected, you can increase or decrease the size of the window with the mouse wheel (while your mouse cursor is on the gray shaded area).
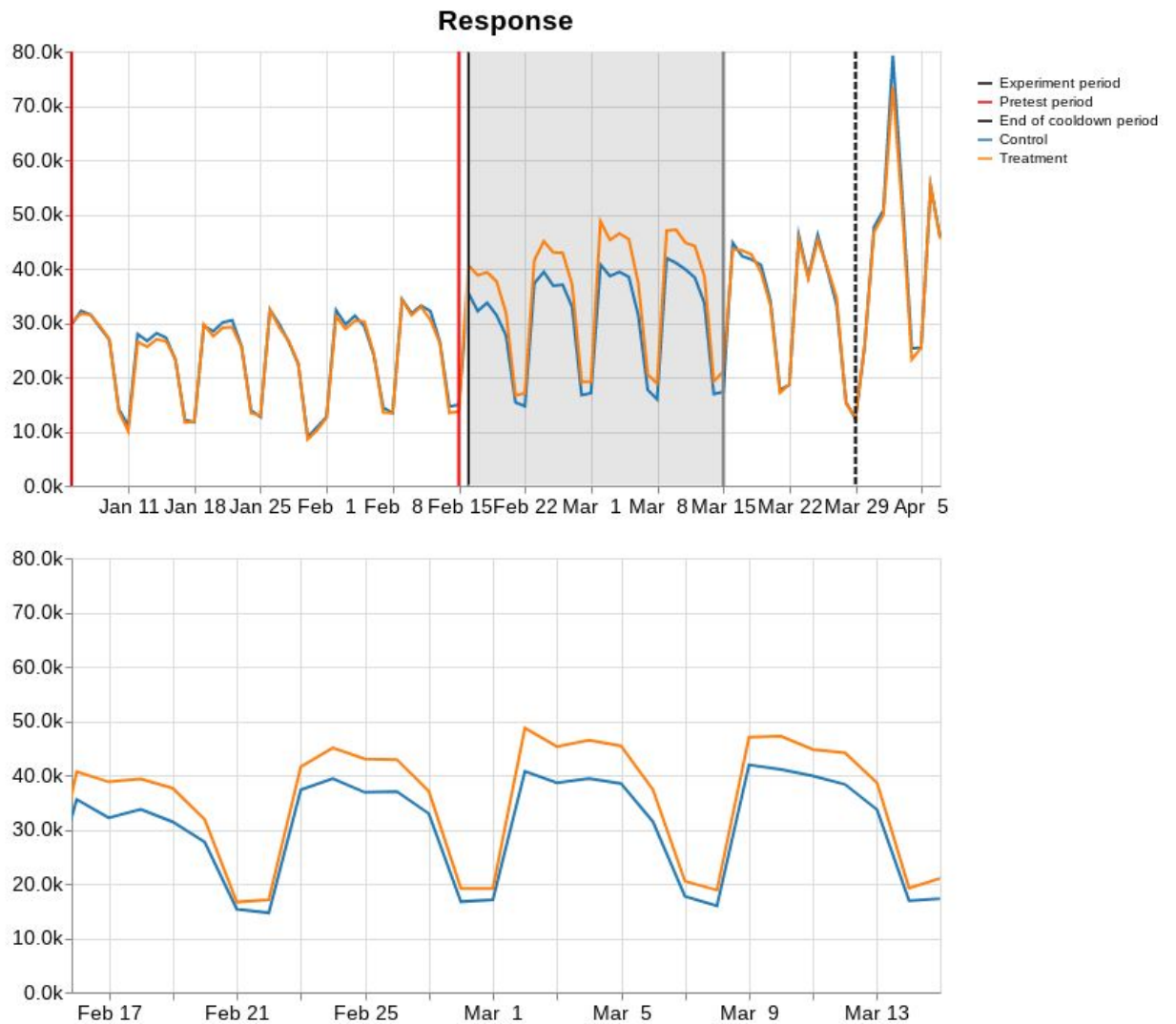
Action needed: run the cell.

Cell 4

[View in colab]

Description: print the summary of the results from TBR using either only the test period (without the cooldown period) or both the test period and the cooldown period, as shown below. The results contain the point estimate for the iROAS, the confidence interval, precision, posterior probability of a positive iROAS, and others summary statistics. The user can switch tabs (highlighted by the red arrow in the picture below) to select which results to present (with or without cooldown period).

Results without cooldown period   Results with cooldown period

```
Summary of the results of TBR:

estimate        precision       ci_level        lower bound     upper bound
2.947           0.121           0.90            2.83            [inf]


Probability that the iROAS is >= 0.0: 1.0

incremental cost = 50K

incremental response = 147K

incremental response as % of treatment response = 14.82%
```
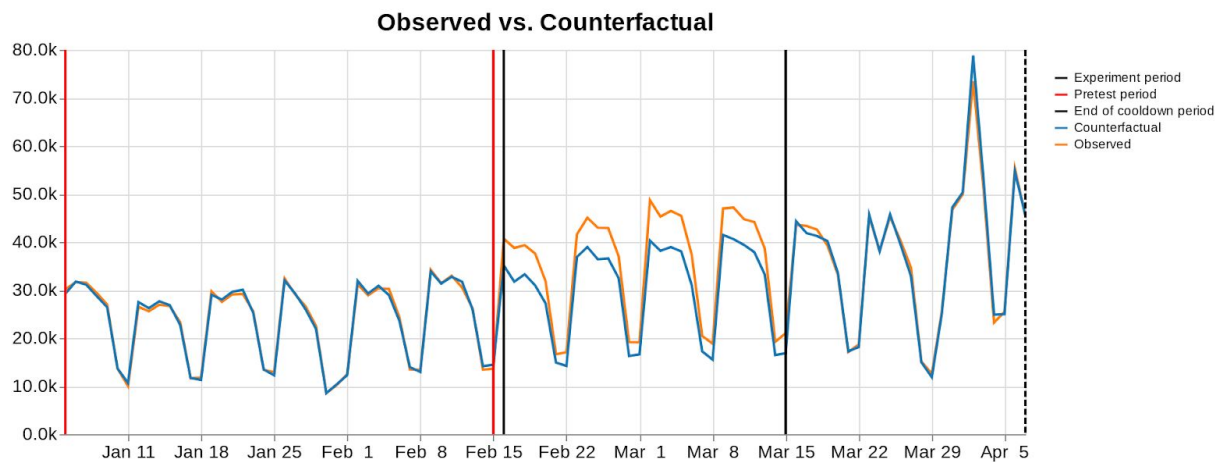
Action needed: run the cell.

Cell 5

[View in colab]

Description: Visualization of the results of cell 4, where:

- The observed and counterfactual time series for the response variable are compared

Observed vs. Counterfactual

- The daily/weekly pointwise difference between the observed and counterfactual response, with confidence bands, is shown

Pointwise difference
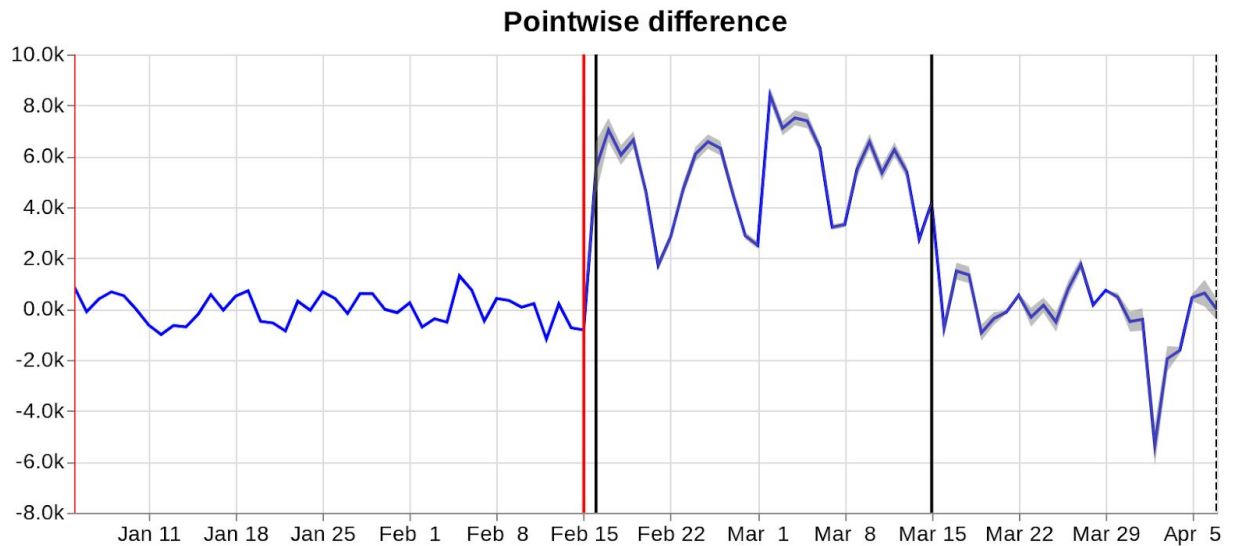
- The cumulative effect, with confidence bands, is plotted during the test and cooldown periods.

Cumulative effect
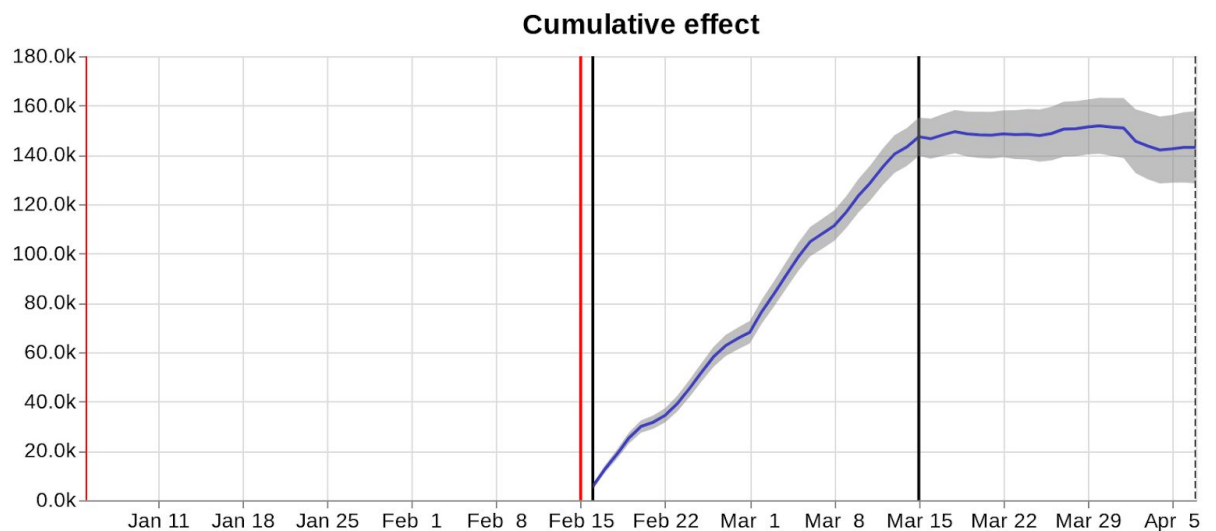
Again, one can select a window in the first plot (comparison of observed vs. counterfactual) to zoom in on a specific time window, e.g.

Observed vs. Counterfactual
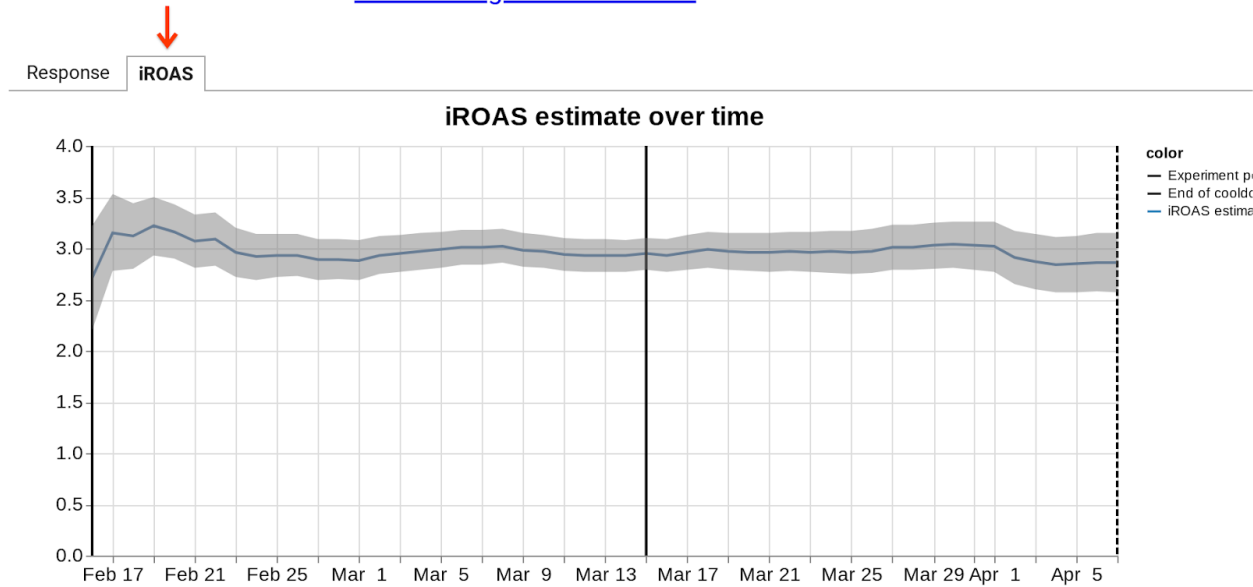

Pointwise difference
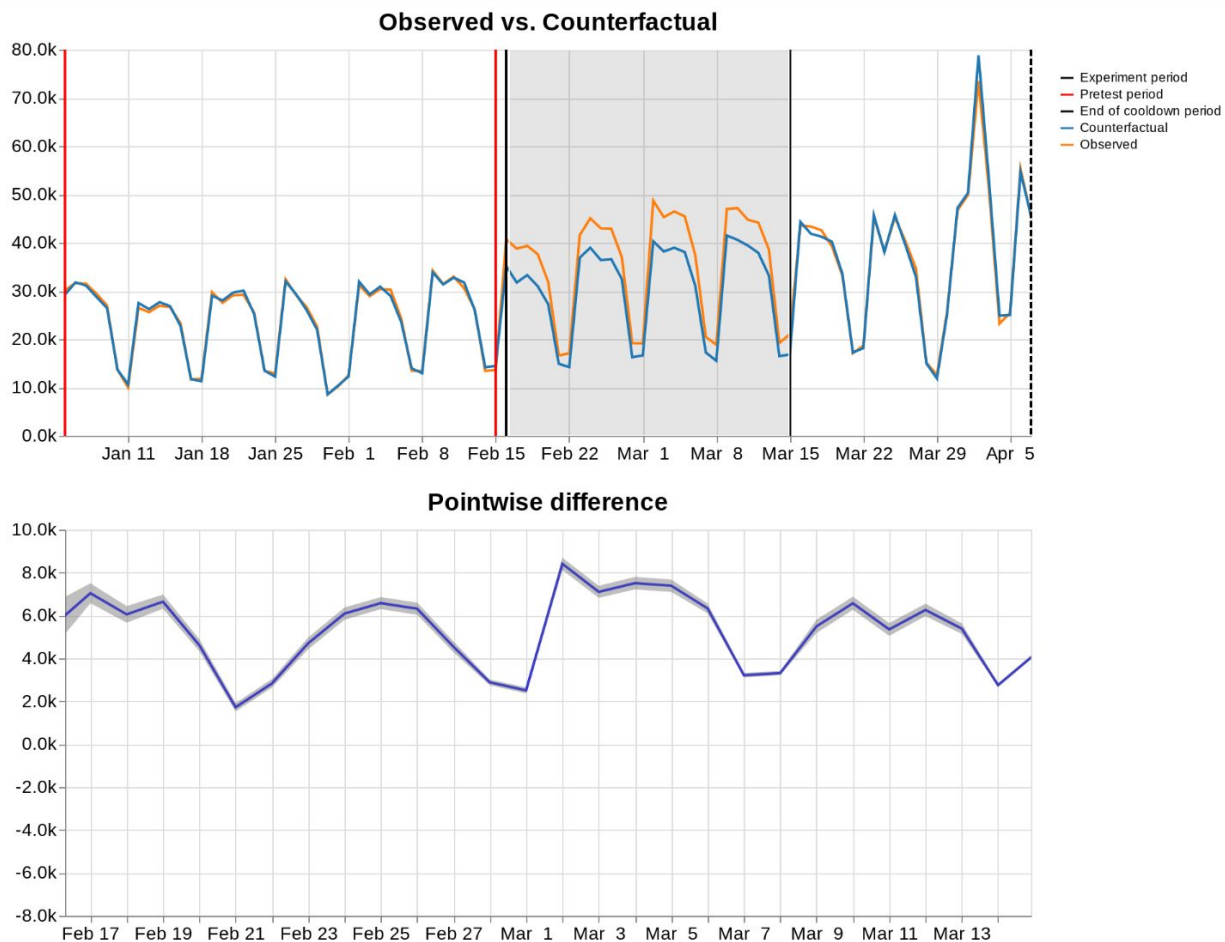
If the pretest spend was not 0 (or very close to it), then similar plots as those above for response will be created for the ad spend, and we can switch to those by clicking on the corresponding tab (indicated by the red arrow below)

Visualization of the results. [Link to the guide for this cell](#)

Observed vs. Counterfactual
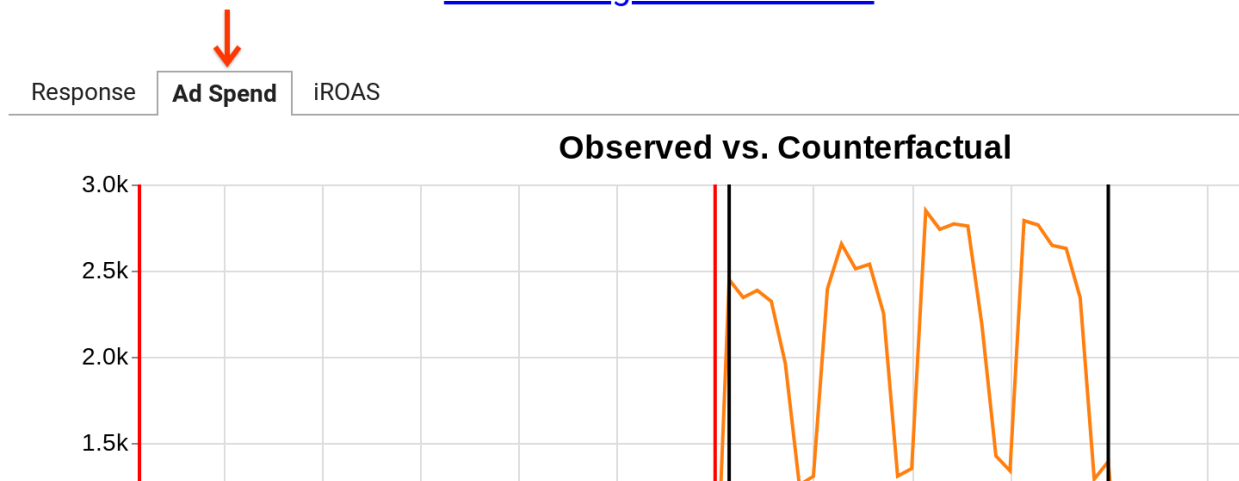
Additionally, you can select the "iROAS" tab (indicated by the red arrow in the figure below) to check how the iROAS estimate evolved over time

Visualization of the results. Link to the guide for this cell

Action needed: run the cell.