Overview

IES's sister company, SEI is a discount retailer of winter jackets that sells overstock goods from three major sporting outerwear brands at various locations across the United States. SEI regularly experiments with discounting list prices with the aim of improving short and long-term profitability.

In this challenge, you will analyze SEI's 2015 and 2016 transaction-level sales data, measure how effective SEI's discounting programs have been, and suggest alterations to the programs that will help SEI become a more profitable business.

About SEI

Retail Stores – In mid-2014 SEI simultaneously launched retail locations in the following six cities: Albany, NY, Bend, OR, Eugene, OR, Jacksonville, FL, Springfield, MA, and Tacoma, WA. Each of these stores is a full-fledged carrier of all three of SEI's brands, and participates fully in all of SEI's national discount sales.

Management encourages each retail location to perform unadvertised price tweaks on a daily basis to test the effect this has on sales. There are no fixed limits to how large these price tweaks are, but in practice, the amounts are generally smaller than the discounts offered in both kinds of national sales (see below).

Inventory – SEI stocks jackets from three different outerwear brands: Bogota, Pangea, and South Face. SEI purchases wholesale directly from each of the three brands and receives significant discounts because these goods are overstocked in the brand owners' warehouses. However, in exchange for this pricing discount, SEI rarely has the ability to negotiate how much inventory they purchase. Wholesale purchases from each of the three brands are usually over one or two product lines, varying overwhelmingly by only color and sizing.

National Pricing – Owing to the limited number of product lines among each brand and SEI's desire to be perceived as a nation-wide retailer, SEI has, to date, offered a single nationwide default list price of items sold under each of the three brands it carries: Bogota @ $75, Pangea @ $105, and South Face @ $85.

These price points are below standard retail prices for these brands, but they still reflect a healthy margin on top of the wholesale cost of the outerwear, thus allowing SEI to remain profitable while offering significant discounts relative to their list prices. Moreover, the relative pricing of the three brands reflects consumer perceptions of the brands – Pangea is considered a premium brand, Bogota a budget brand, and Pangea a mid-tier brand.

National Discount Sales – In addition to the aforementioned, unadvertised retail / location specific daily price tweaks, SEI offers nationwide sales with significant brand-specific discounts. To date, these have fallen into two categories: Holiday Sales – these are large discount sales that occur around major holiday weekends; Seasonal Sales – these are smaller discount sales that last for longer periods of time (typically a month or so).

About the Provided Data

SEI has provided the following sets of data for your analysis:

1. *2015 and 2016 Seasonal Discount Sales.csv* – This data set, compiled by an SEI analyst, is a list of nation-wide seasonal sales.
2. *2015 and 2016 Holiday Discount Sales.csv* – This data set, compiled by a different SEI analyst, is a list of Holiday Discount Sales. These sales are not cumulative with overlapping seasonal sales; rather the holiday sales amount is offered instead of the seasonal sale amount if both are in effect.
3. *Daily Brand Prices by Store, 2015 – 2016.csv* – The daily price by store and brand offered for all goods sold. This is a copy of a shared Google Spreadsheet manually appended to by each retail store manager at some point after prices were set for each day.
4. *transaction_extract_2015_2016.csv* – Sales quantities by transaction extracted from our transaction database. SEI's programmer notes that brand IDs 1,2, and 3 correspond to Bogota, South Face, and

Pangea respectively, and that store IDs 1,2,3,4,5, and 6 correspond to Jacksonville, Albany, Springfield, Bend, and Tacoma respectively.

Data (in zip format) is downloadable here: https://s3-us-west-2.amazonaws.com/ies-challenges/sei_tx_files.zip

Instructions

Use your favorite spreadsheet program or statistical analysis tool to produce all three of the following:

1. *Presentation of Problem, Analysis, and Conclusion* – Generate a presentation describing the problem you're trying to solve, how you've broken the problem down (along with any assumptions), a summary of the analysis addressing the problem, and your conclusions. The goal of this document is to highlight what you're interpretation of the problem you're trying to solve and the most important aspects of what you found – it should stand on it's own as a presentation of your conclusions. The format can be anything from a Powerpoint / Google Sheets presentation to a well-written HTML doc generated from a Jupyter Notebook, R Markdown document, or similar.
2. *Exploratory Analysis Write-up and Materials Construction* – Produce some form of documentation of the data manipulation steps, exploratory graphics, and exploratory questions you used to arrive at the conclusions, plots, and anything else arrived at in the previous step. The point of this document is to record your thought process is generating the above presentation, and to fill in any associated technical gaps. Anything from additional spreadsheet tabs, to code notebooks / scripts work here.
3. *Post-Mortem* – Spend 15 – 30 minutes answering the following questions after you've finished:
   - How long did you spend on the challenge?
   - What was the most confusing aspect of your analysis? The most interesting?
   - What outstanding questions do you have about SEI's business or the data set?

Completion Guidelines

- Really spend the time required to figure out what specifically you're trying to solve for SEI. There are some common problems faced by all manner of retail clothing companies.
- Don't' worry too much about tooling. R, Python, Matlab, and even Excel can be fine choices here.
- "Whoa, this data is really messy!" – Yes, that's kind of the point! Propose one or more ways of cleaning it up, document any assumptions you've made, and move on.
- "I can't precisely measure the effects of price discounts" – That's also kind of the point! Don't give up too early in your modeling efforts, but do recognize that random noise (if truly random!) can be an acceptable artifact in all sorts of data.
- Download the data files locally before conducting your analysis.
- Send your submission and post-mortem as a single zip file or shared Google doc.

Evaluation

We will evaluate your submission (analysis code + presentation + post-mortem) along the following dimensions:

- Data manipulation and exploration – Does your analysis demonstrate correct and efficient manipulation of data into a format amenable to analysis? Have you correctly incorporated provided information? Does your analysis proceed with a logically sequenced series of questions you answer about the data?
- Modeling & statistical analysis – Does your analysis properly segment & model the underlying data relative to intuitively observed qualities? Have you properly accounted for biases and appropriateness of models? Is your analysis honest about the limitations of what it can say?
- Business reasoning & communication – Does your analysis demonstrate the ability to reason critically about how the presented data relates to SEI's business objectives even if certain links are not described explicitly? Can you communicate your conclusions succinctly and in a way that inspires confidence? Are your conclusions focused on parts of your analysis most related to SEI's profitability.