

## Final Assignment



IOMS Department

# Statistics and Data Analysis

## Professor William Greene

Phone: 212.998.0876

Office: KMC 7-78

Home page: [www.stern.nyu.edu/~wgreene](http://www.stern.nyu.edu/~wgreene)

Email: [wgreene@stern.nyu.edu](mailto:wgreene@stern.nyu.edu)

Course web page: [www.stern.nyu.edu/~wgreene/Statistics/Outline.htm](http://www.stern.nyu.edu/~wgreene/Statistics/Outline.htm)

## Final Assignment

You are the owner(s) of a company, SternIceCream, Inc. that operates stores in New York, Chicago, and Los Angeles. You have been operating for quite a long time, and believe you understand your market well. Not long ago, you observed your market share beginning to slip a bit and decided to embark on a promotion campaign in all three cities to help to increase your sales. At this point, after the marketing campaign is over, you would like to investigate whether it worked. Your in house economist (Guillermo Verde) has collected the data listed below for you, for the 365 days of the year 2017. Your assignment is to do the following:

- A. Summarize the data in this data set in a way that will help the reader of your report see a basic picture of your ice cream business. Use standard statistical devices, including graphs. Make this a concise readable, summary of the data that will help your reader understand the analysis to follow.
- B. Determine, using regression methods, what effects that are contained in your data help to explain your ice cream sales. I.e., specify and estimate an equation that adequately describes your sales. Present the relevant statistical results in neat, understandable tables that will enable your reader to learn about your market from your model. As part of your results, report your estimate of the price elasticity of demand for your product. More generally, discuss whether or not the data suggest that sales respond to the variables that are in your equation (data base).
- C. Answer the question “Did the promotional campaign work?” statistically. Justify your answer with the results of your estimated model.

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For each city, you have collected data on each of the 365 days of 2017. The following variables are in your database:

Three cities' populations:       New York, 8 million,  
  Chicago, 4 million  
  Los Angeles, 3 million

SALES = Total sales of cups of ice cream, in millions of cups.

PRICE = The average price that stores are charging for your ice cream. The stores differ quite a bit in the price they charge, so this variable changes quite a bit

COMP = Your main competitor's average price. Since your competitor claims they are a "premium" brand, while you are for "every person," COMP is generally higher than PRICE

TEMP\_NY, TEMP\_CHI, TEMP\_LA are the average temperatures in the cities each day in the year.

ECONOMY = an indicator of overall national economic sentiment. 2017 wasn't a very good year, and it got worse as the year went on, so the index declines over the year.

NEWCHAIN = a variable that indicates that a very large new restaurant chain that specializes in lunch, and serves your product, opened in Chicago in the middle of the year. This is a binary variable that equals one for the days when this chain was open.

WEEKEND = a binary variable that is one on Saturday and Sunday. People like to go out for ice cream on weekends.

LA, CHI, NY are three binary variables that indicate which observations are for which city

DAY\_WEEK = a weekday variable, taking values 1,2,3,4,5,6,7,1,2,3,4,5,6,7,...

DAY\_YEAR = a yearday variable that takes values from 1 to 365, for each city.

PROMO = a binary variable that equals 1 from July 1 until the end of the year. This is when you ran your promotion.

The data are arranged in the Minitab project file

<http://pages.stern.nyu.edu/~wgreene/Statistics/IceCream.mpj>.

You can also obtain them in the form of an Excel spreadsheet file,

<http://pages.stern.nyu.edu/~wgreene/Statistics/IceCream.xls>

Note, in your analysis, you should analyze per capita sales, not total sales. You can make the conversion by creating  $POP = 8*NY + 4*CHI + 3*LA$ . Then, divide SALES by POP. To make a new variable in Minitab, use Calc → Calculator, then the name of the new variable in one window and the expression (after the equals sign above) in the bigger window, then press OK. After you create POP, you can create SALES\_PCAP or some other name.