Project 5: A/B Test a New Menu Launch | Ioanna Vasilopoulou

Step 1: Plan Your Analysis

1. **What is the performance metric you'll use to evaluate the results of your test?**
   The performance metric we will used to evaluate whether to introduce gourmet sandwiches and limited wine offerings to increase sales in Round Roasters.

2. **What is the test period?**
   Test period is a 12-week period which starts from the the 29th of April 2016 to the 21st of July 2016

3. **At what level (day, week, month, etc.) should the data be aggregated?**
   Data should be aggregated at a weekly level.

Step 2: Clean Up Your Data

In this step, you should prepare the data for steps 3 and 4. You should aggregate the transaction data to the appropriate level and filter on the appropriate data ranges. You can assume that there is no missing, incomplete, duplicate, or dirty data. You're ready to move on to the next step when you have weekly transaction data for all stores.

We firstly join the RoundRoasterTransaction and Round-Roaster-Store datasets filtering the dates to include 76 weeks* of data starting on the 06th of February 2015 up to the 21st of July 2016.

*Total of 76 weeks = 52 weeks of data required by the A/B test plus 12 weeks (24 weeks in total) for each data set to calculate seasonality.

We created 3 additional columns:

- Week: Shows each week's number (from 1 - 76) based on the start date of the data which is the 6th of February 2015.
- Week_Start: Shows the start date of each week
- Week_End: Shows the end date of each week

Step 3: Match Treatment and Control Units

Apart from trend and seasonality...

1. **What control variables should be considered? Note: Only consider variables in the RoundRoastersStore file.**
   The control variables that should be considered are AvgMonthSales and Sq. Feet.

2. **What is the correlation between your each potential control variable and your performance metric?**
   Pearson Correlation Analysis shows us that the performance metric (Gross Margin) has a high correlation with Avg. MonthSales (0.99) and a poor 0.02 correlation with Sq_Ft., as it is below 0.05.

Full Correlation Matrix

	Sum_Gross.Margin	Avg_AvgMonthSales	Avg_Sq_Ft
Sum_Gross.Margin	1.000000	0.990982	-0.024255
Avg_AvgMonthSales	0.990982	1.000000	-0.046967
Avg_Sq_Ft	-0.024255	-0.046967	1.000000

3. **What control variables will you use to match treatment and control stores?**
   The control variables that we will use to match treatment and control stores are AvgMonthSales alongside Trend and Seasonality.

4. **Please fill out the table below with your treatment and control stores pairs:**

Treatment Store	Control Store 1	Control Store 2
2288	2568	9081
2293	9524	12219
2301	9238	3102
2322	3235	2409
2341	2383	12536
1664	1964	7162
1675	1807	1580
1696	1863	1964
1700	1630	2014
1712	7434	8162

Step 4: Analysis and Writeup

1. **What is your recommendation - Should the company roll out the updated menu to all stores?**
Our company required that the predicted impact to profitability should be enough to justify the increased marketing budget: at least 18% increase in profit growth compared to the comparative period while compared to the control stores. After the AB Test analysis we can see a predicted impact between 37.9% and 42.3%; hence the company should roll out the updated menu to all stores.

2. **What is the lift from the new menu for West and Central regions (include statistical significance)?**
AB Test Analysis | West
The lift for the new menu for West region, in the treatment stores is increased by 37.9%. Due to the significance level being at 99.5%, we can say that profit is extremely likely to increase. Furthermore, we can see that the weekly impact during the test period is at $526.50.


AB Test Analysis for Sum_Gross Margin
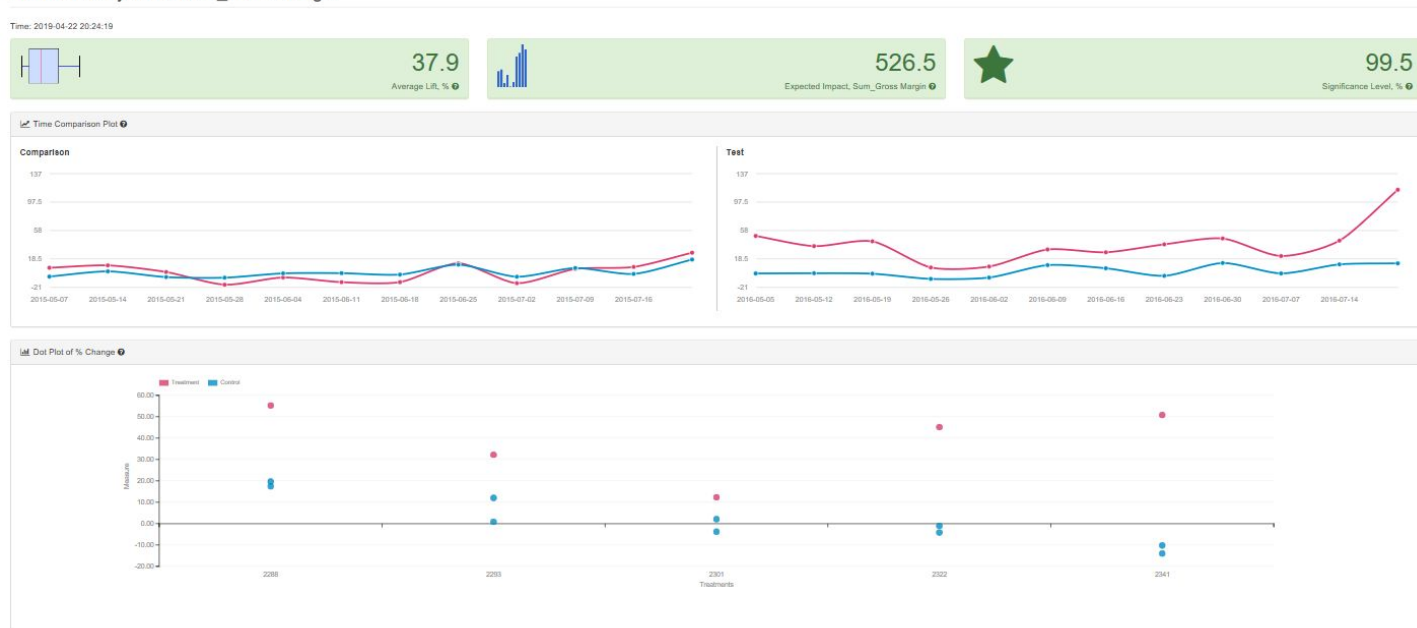
Similarly to the West region, we can see a respective high significance level of 99.5%. The lift for the new menu is increased by 42.3%, in the treatments store. This shows us that the profit will increase, which is also obvious on the graphs below, where we can see the tendency of the treatment's store profits to increase. Moreover, the impact is $817.40, per week.

AB Test Analysis for Sum_Gross Margin
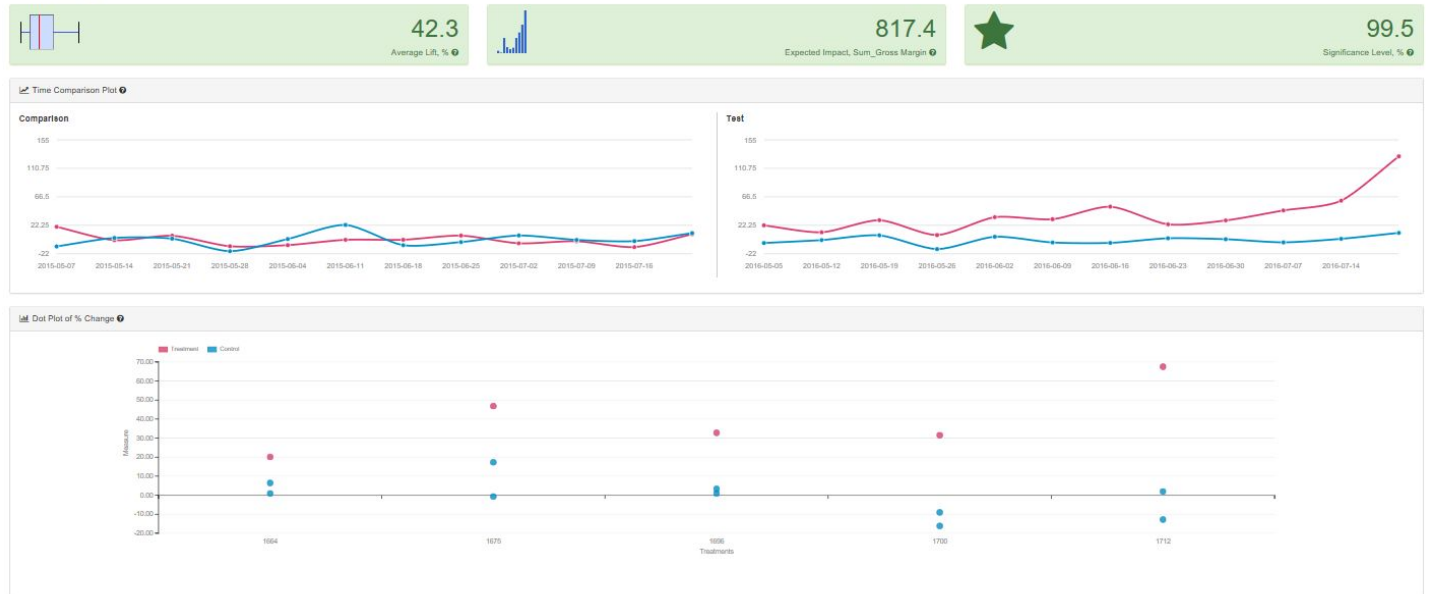
3. **What is the lift from the new menu overall?**
AB Test Analysis | Overall

The average weekly lift, overall, is 40.1% with the statistical significance of 100%, which shows us that the impact to the profit will be positive. Weekly expected impact, per store per week, is $672.

AB Test Analysis for Sum_Gross Margin