Project: Analyzing a Market Test

About the Project

In this project we will be conducting an A/B test for a restaurant chain (Round Roaster), planning to introduce new products into its Menu.

What is A/B testing and why is it suitable in this case?

A/B testing is a basic randomized control experiment. It is a way to compare the two versions of a variable to find out which performs better in a controlled environment. It is mostly used in cases where there is not enough information to do other types of predictive analysis. In the case of the restaurant, because the menu has not been introduced before there is no data to see how it will impact sales. So the restaurant splits its store into two groups, control and treatment, one gets the new menu and the other does not for a period of time called the Test period.

After the test period, the sales information from both groups is analyzed to see if there are any statistically significant changes. Statistical significance is a determination that a relationship between two or more variables is caused by something other than chance.

Step 1: Plan Your Analysis

To perform the analysis, I will be preparing the data, and determine some key factors such as:

1. What is the performance metric we will use to evaluate the results of your test?

   Answer: The gross margin.

2. What is the test period?

   Answer: 12 weeks. From the 29th of April 106 to the 21st of July 2016.

3. At what level (day, week, month, etc.) will the data be aggregated?
   Answer: The data will be aggregated on a weekly basis/level.

Step 2: About the data

The data are in 3 csv files; a file containing the details of the store, one containing details of the treatment store and a last one containing the transaction details at all the stores. I will clean up and do some formatting and blending before I can begin my analysis. I will be using Alteryx for all my analysis.

Step 3: Match Treatment and Control Units.

In this step, I will be creating trend and seasonality variables and using them with other control variables to match two control units to a treatment unit. I will calculate the number of transactions in each store every week to calculate trend and seasonality.

Apart from trend and seasonality, other variables that I will be using to match treatment stores to control stores are, Square foot(size of the store) and the average monthly Sales. It is important that we match stores that are as similar as possible.

Correlation between each potential control variable and performance metric?

Pearson Correlation Analysis

Full Correlation Matrix

	Sum_Sum_Gross.Margin	Sq_Ft	AvgMonthSales
Sum_Sum_Gross.Margin	1.000000	-0.019345	0.790358
Sq_Ft	-0.019345	1.000000	-0.046967
AvgMonthSales	0.790358	-0.046967	1.000000

As can be seen from the above, average monthly sales is highly correlated with the performance metric gross margin so I will be using it in addition to seasonality and the Average monthly Sales.

A table showing the matching of treatment to control stores.

Treatment Store	Control Store 1	Control Store 2
1664	7162	8112
1675	1580	1807
1696	1964	1863
1700	2014	1630
1712	8162	7434
2288	9081	2568
2293	12219	9524
2301	3102	9238
2322	2409	3235
2341	12536	2383

Step 4: Analysis and Writeup

Recommendations:Should the company roll out the updated menu to all stores?

Answer: My recommendation is that the company roll out the updated menu across all the stores because the analysis of the test shows that the new menu will lead to a very significant increase in Sales for the stores as the stores that the new menu was tested in showed an increase in Sales margin with very high statistical significance which implies that the sales was due to the addition of a new menu.

1. What is the lift from the new menu for West and Central regions (include statistical significance)?

   Answer: The lift for the central region is 43.5% increase in Sales margin and a statistical significance of 99.6% while the lift for the West region is 37.9% and a statistical significance of 99.5%.

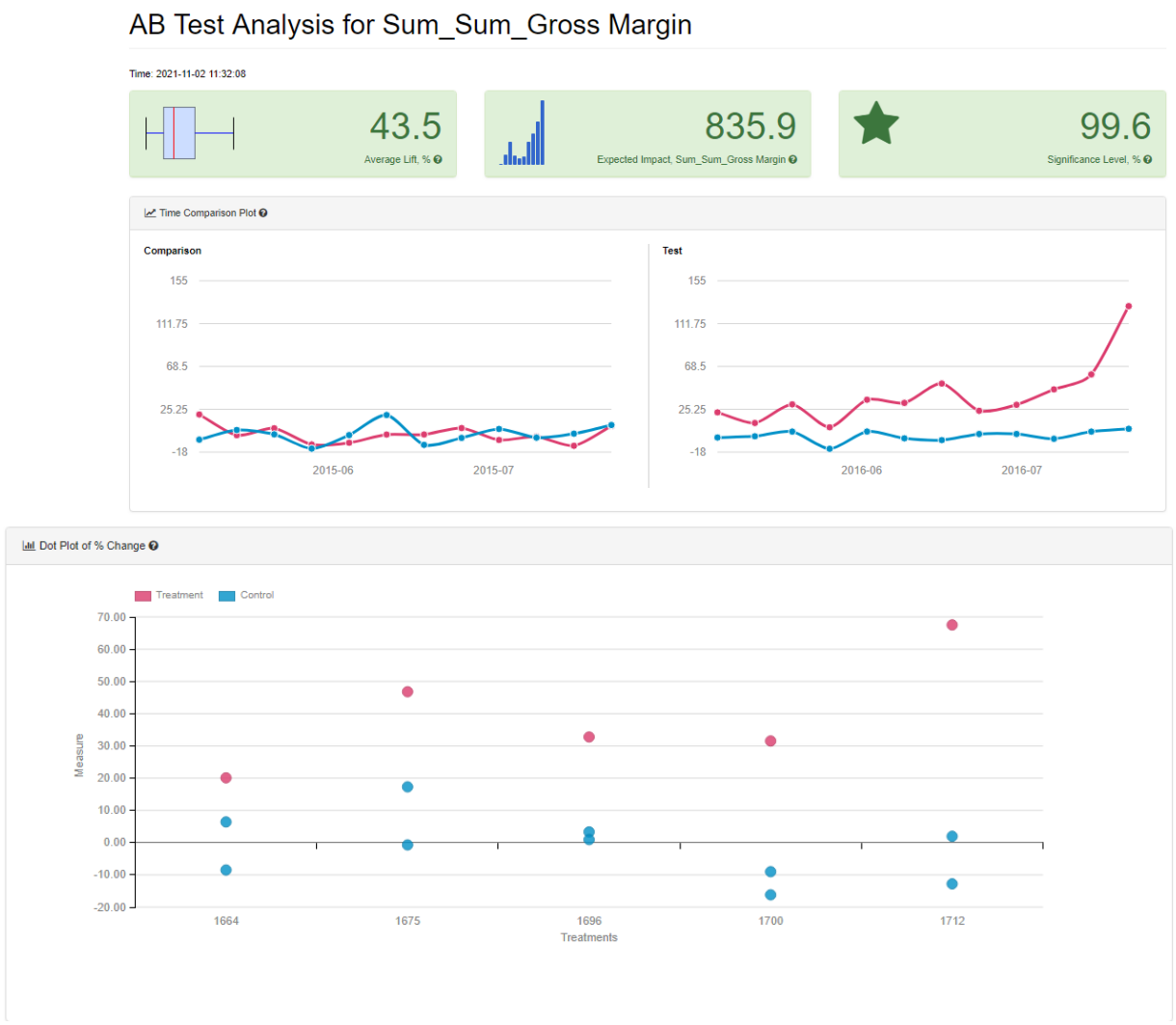

Figure 1: Lift and comparison for the Central Region

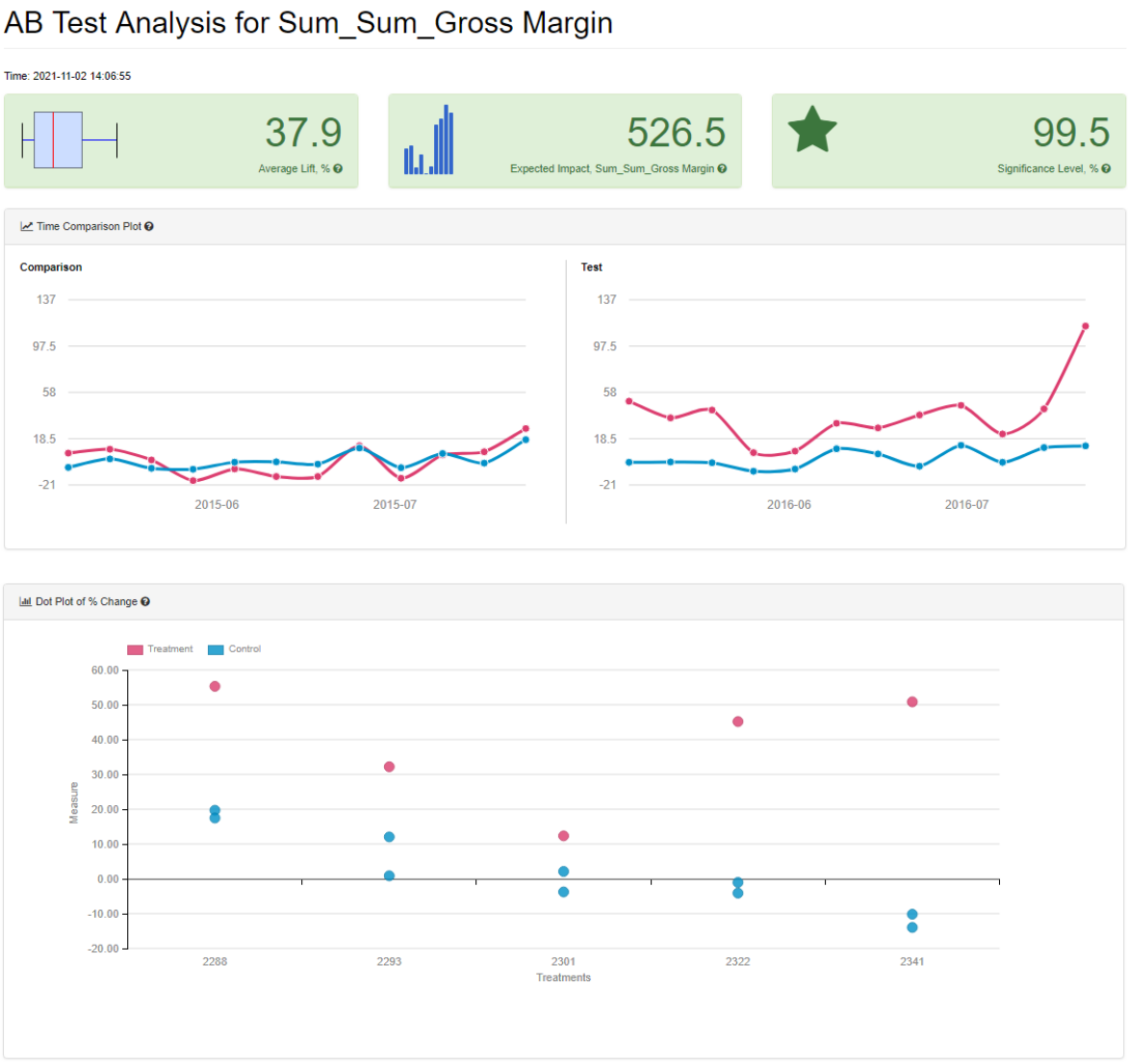

Figure 2: Lift and comparison for the West Region

3. What is the lift from the new menu overall?

   Answer: 40.7% with a statistical significance of 100%

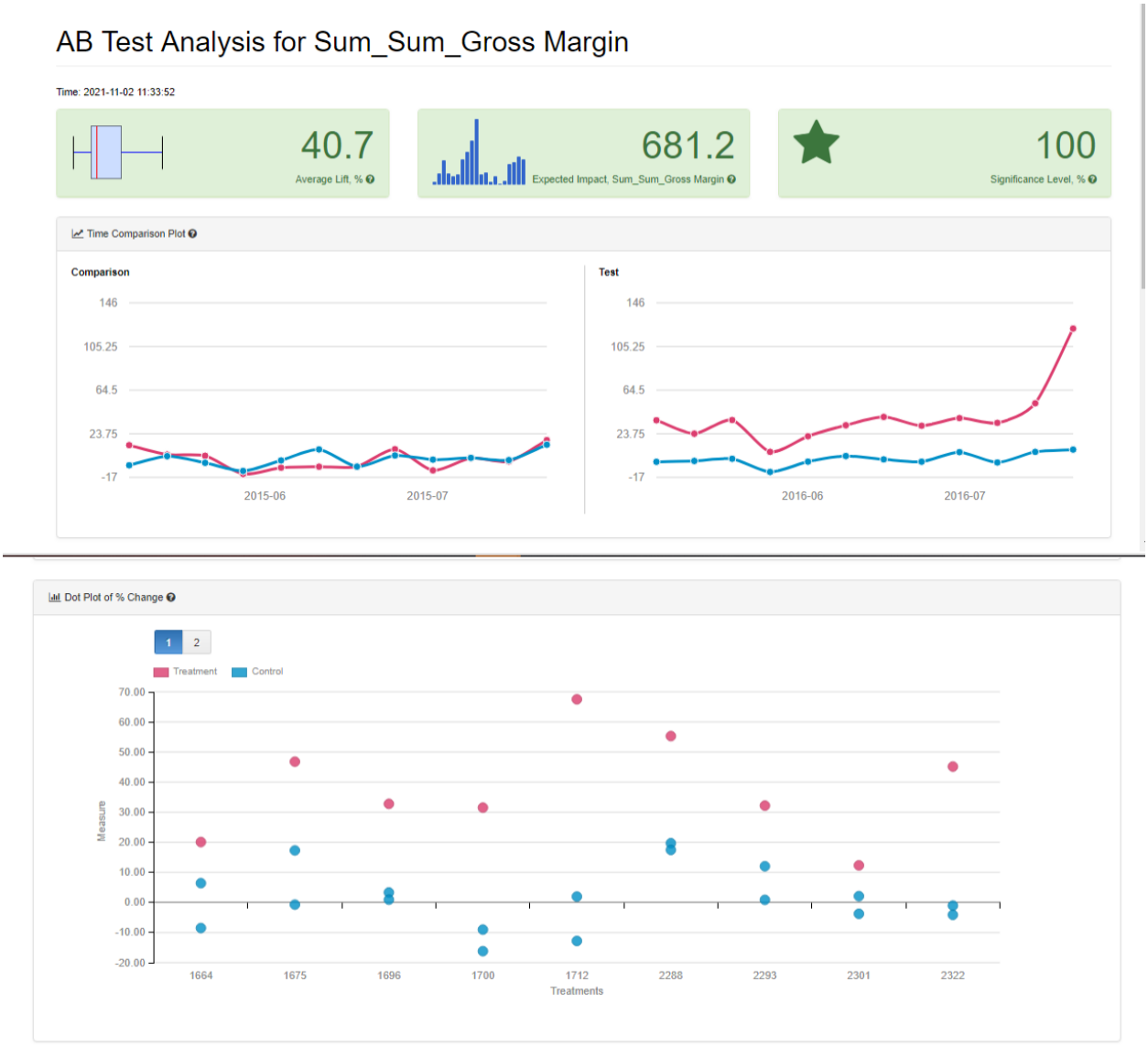

Figure 3: Overall lift and comparison

As can be seen from the above diagrams, all the treatment store with the new menu recorded an increase in sales and gross margin.