Walmart or Meijer: Is there a Difference?

By: Blake Babec, Ian East and Jack Michalowski

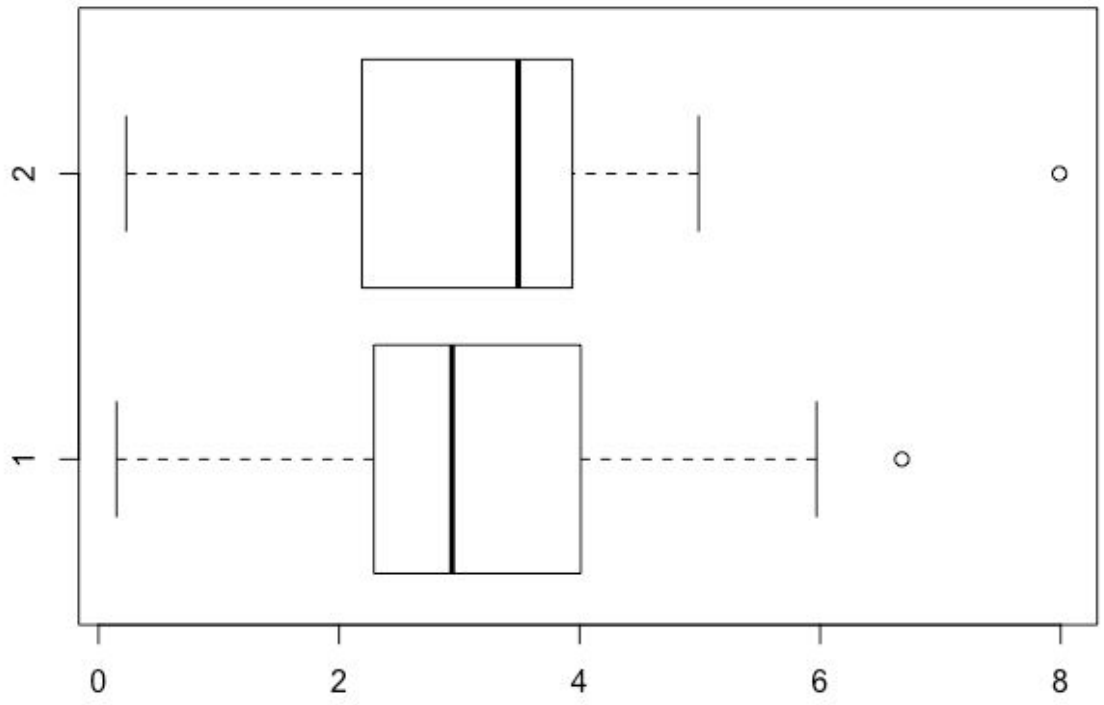
Submit Day: 4/20/2020

Table of Contents

Introduction

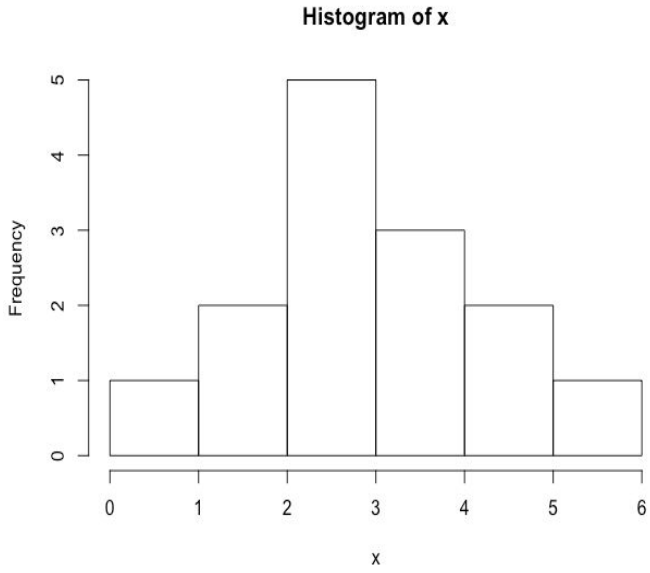
The days of traveling to the local supermarket in order to purchase locally grown produce and meat are unfortunately mostly over. Now, Americans travel in bunches to goliath shopping centers that have all of their favorite unhealthy foods. While shopping used to be done by traveling to multiple stores that all offered different items, we decided it would be easier and faster if all of these items were instead just located in one store. Yet America could not be satisfied with just one chain of supercenter stores. Instead, multiple supercenter chains sprung up around the US, competing with each other as to who could offer more products at a cheaper price. Now, consumers have their choice of numerous stores where they can go shopping at and buy all of their desired items. While a slight percent of the population might feel some sort of loyalty to a certain chain, the vast majority of people simply shop at the stores that have the cheapest prices for the things they want. Therefore, mega stores are constantly competing with one another, trying to find ways to outdo each other. Two stores in particular, Walmart and Meijer, have come to represent the extremely cheap prices these supercenters can offer.

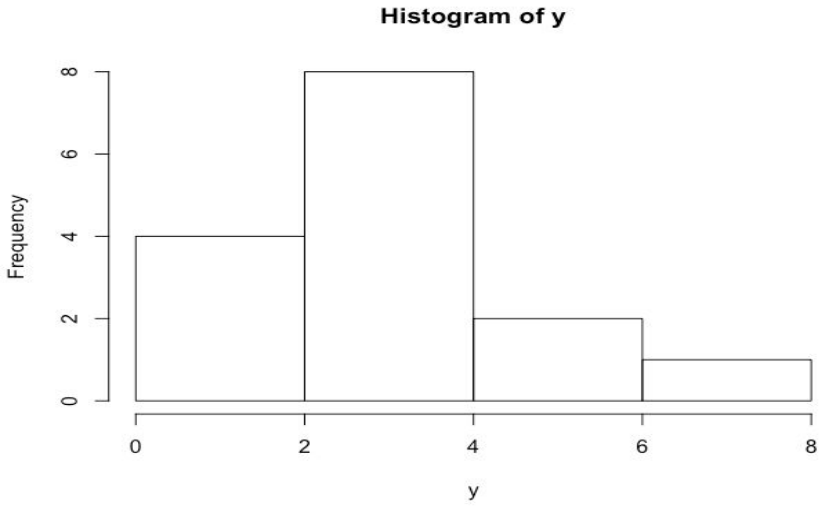
While Americans know these two chains for their cheap prices on a wide variety of items, the verdict is still out on whether a difference between the two behemoths exists. The test that we will be conducting in this report is designed to finally answer this question. By comparing the mean price of 15 identical items sold at both Walmart and Meijer, we will be able to determine whether there exists a difference in the average price at the two stores. First, we will collect the prices on 15 identical items sold at both Walmart and Meijer from their online store websites. The prices of these items will be displayed in a series of graphs, showing the difference in prices for each item at the two stores as well as the average price and the price distributions for each store. Then, a confidence interval test will be conducted in order to determine a range for the difference in mean prices between the two stores. Lastly, a hypothesis test will be conducted in order to determine whether a significant enough difference in average price exists between the two supercenters. In the end, all of the group's findings will be summarized in a concluding report.



The above boxplot displays the ranges of prices of Walmart(1) and Meijer(2) goods. We see that there are 2 outliers. The mentioned outliers have been removed from the data set to reduce bias when performing the hypothesis test and confidence intervals. The boxplot allows for a better understanding of the distribution of data by labeling the max, min, quartiles and any outliers. We can see that the median splits the data evenly between 2 and 4.

This graph shows the prices for the 15 items that the group selected from Walmart and Meijer. On the x-axis is the number of the item and the y-axis is the price of the item. All of the items are included in the test except for item 8. After conducting an outlier test, item 8 was determined to be an outlier which could adversely affect the results of the test. As can be seen by the similar shape of the line chart for each store, the prices for each item are very similar to one another at each place as a consumer would expect. However, there does exist a difference at each point, with some items having a larger difference than the others. It is this difference that might allow a difference in the mean price of items at Walmart and Meijer to exist.





The two histograms x (Walmart) and Y (Meijer) show the distribution of prices for each store.The histogram for Walmart appears to be nicely normal and is centered around the mean of 2.9. The histogram for Meijer appears to be approximately normal centered around a mean of 3.3.

	Walmart	Meijer
SD	1.492292	1.372255
Min	.15	.23
Q1	2.265	1.99
Median	2.81	3.32
Mean	2.921	2.9929
Q3	3.79	3.89
Max	5.97	4.99
Number of Items	14	14

The statistics available in this table will be the statistics used to conduct our tests for the question.

*Given numerical values excludes outlier

Confidence Interval

Parameter(s) of Interest :

μ_1 = average price of items at Walmart
μ_2 = average price of items at Meijer
$\mu_1 - \mu_2$ = difference in mean price of items between Walmart and Meijer

Assumptions :

1. Simple Random Sample
2. Large Sample
3. Independent Sample
4. Largest S / Smallest S = 1.49/1.37 < 2, so $\sigma_1 \cong \sigma_2$

We will use a Pooled Two Sample T-Interval statistical procedure to find this 95% confidence interval.

The 95% Confidence Interval :

(-1.186, 1.0418)

Interpretation :

We are 95% confident that the mean difference between the average price of items at Walmart and Meijer is contained within the interval (-1.186, 1.0418).

Hypothesis Test

Parameters of Interest :

μ_1 = average price of items at Walmart
μ_2 = average price of items at Meijer

Hypotheses :

$H_o : \mu_1 = \mu_2$ vs. $H_a : \mu_1 \neq \mu_2$

Assumptions :

1. Simple Random Sample
2. Large Sample
3. Independent Sample
4. Largest S / Smallest S = 1.49/1.37 $<$ 2, so $\sigma_1 \cong \sigma_2$

We will use a Pooled Two Sample T-Test statistical in order to reject or fail to reject the null hypothesis.

Test Statistic :

t = - .13270

P-Value :

p = .89545

Decision :

Since p > .05, we fail to reject H_o

Interpretation :

At 5% significance level, data do not provide evidence to say that the average price of items at Walmart and Meijer are different.

Conclusion

According to the hypothesis test, the resounding evidence is that there is not a difference in mean price of items between Walmart and Meijer. When the confidence interval was conducted, it failed to yield any conclusive results. Since the interval had a negative left end and a positive right end, it meant that the mean difference could have been both positive and negative. Have the confidence interval been entirely negative, since the parameter was Walmart minus Meijer, it would have meant that Walmart had the lower mean prices. Likewise, had the confidence interval been entirely positive, this would have shown that Walmart had the higher mean prices. Since the interval was both though, it was up to the hypothesis test to answer the question. In the end, the evidence did not support the alternative hypothesis which stated that the mean price of items at Walmart is not equal to the mean price of items at Meijer, therefore confirming the null hypothesis.

Essentially, what this means for a consumer is that there is no statistical difference between the two supercenters in prices. Shopping at one or the other will have very little to no effect on the finances of a household. This then probably begs the question of why do multiple chains of supercenters exist if there is no difference between them. The answer lies in the competition that they provide one another that requires them to keep their prices so low and equal to each other. If Walmart were to raise their overall price level, consumers would simply go to Meijer instead and vice versa. What can make a big difference between the two stores is their location to you. As they have no overall price difference, shopping at the closest one will save you the most time, which is the most valuable item in the world.