Link to Tableau package:
https://drive.google.com/drive/folders/1S-ChzjgLFOTJeWjsjNetDdFg5Gxw6_jF
(target.twbx)

Target Sentiment and Household Income Analysis

Introduction:

In the past few years, several news outlets have investigated the Target pricing system. They found that Target uses *dynamic pricing*, meaning they change the prices in their stores based on time of day, demand, or location. This also means that Target changes prices based on what city, suburb or other community the consumer is in. In order to achieve this, Target tracks your location when you allow access for it to do so in the company app. One investigation found that prices can change in the app depending on whether you're inside the store or not, as shopping through the app in-store results in more expensive prices.

Target says they do this so that their prices match those of the local markets.

This finding suggests that Target pricing stays relatively the same in its locations across the country, as its dynamic pricing system adjusts them accordingly.

In order to investigate this ourselves, we asked the question:

How do households of different incomes feel about the pricing of Target?

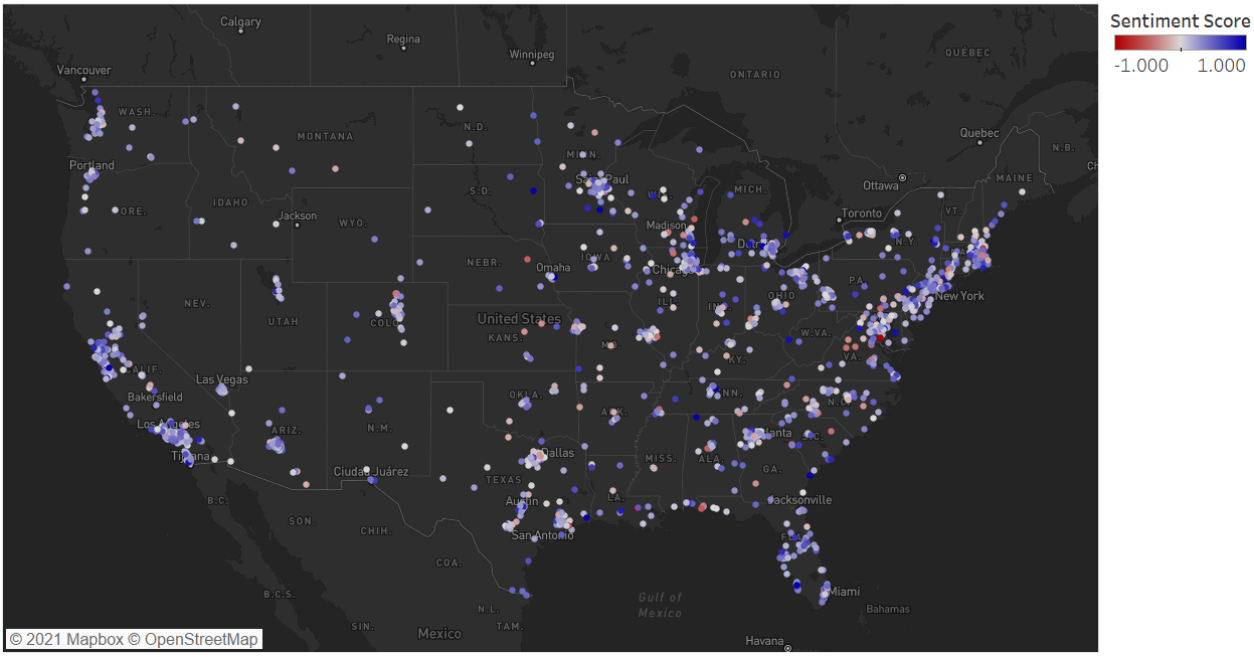
Data Collection:

In order to answer this, we scraped web reviews from Target locations across the country and extracted information such as the sentiment per topic of the review. In this analysis, price is the topic of interest. Then, we gathered data on median household income in 2019 from the US Census.

Analysis:

To begin, we wanted to see the distribution of Target stores across the United States.
In the target location data, we extracted the latitude and longitude of the Target location, which enabled us to plot these locations.

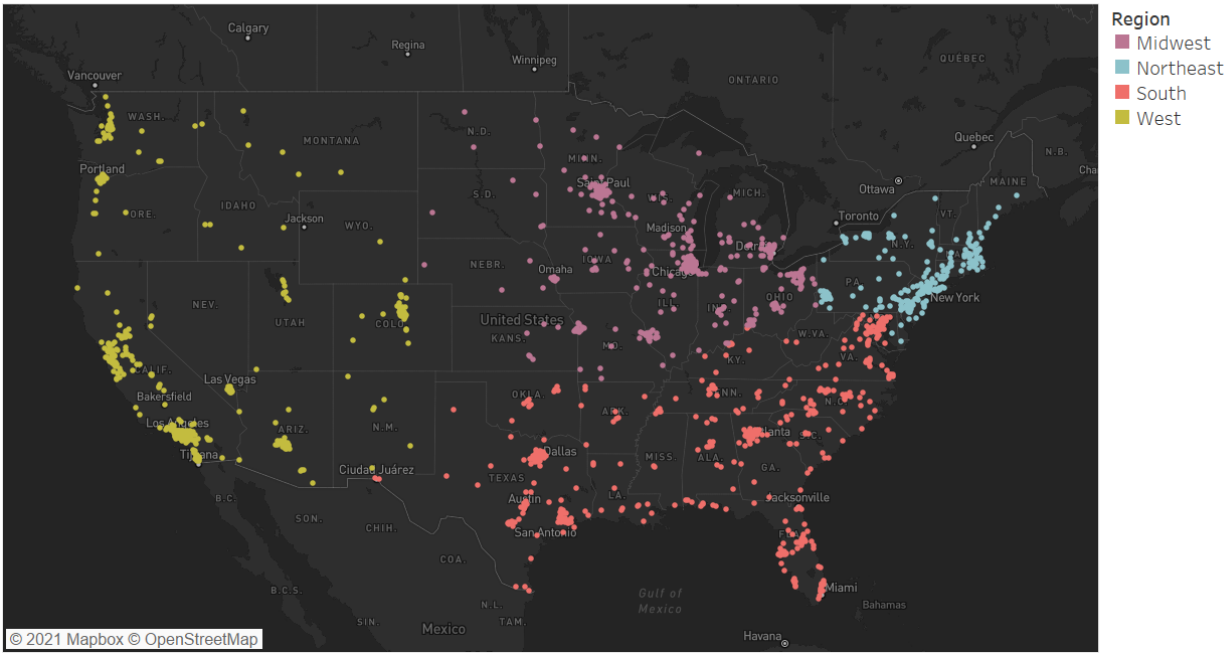
Price Sentiment Across Target Locations



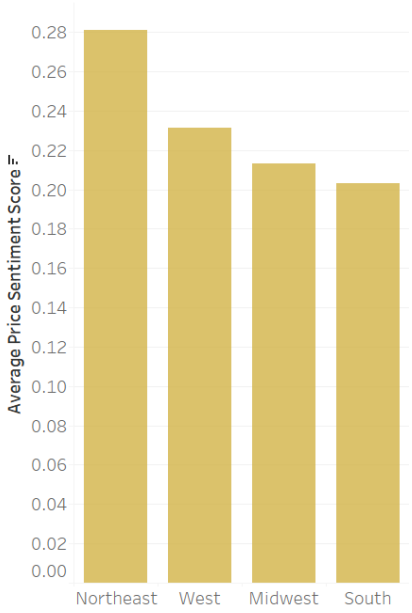
Here, we can see Target locations across the United States. There are a few clusters of locations on the East coast, West coast, and the Chicago area. There are clearly more locations in the eastern half of the country. A more red dot indicates a worse price sentiment score and a blue dot indicates a better price sentiment score.

We can also group the locations by region to then see how price sentiment presents on a larger scale.

Target Locations by Region



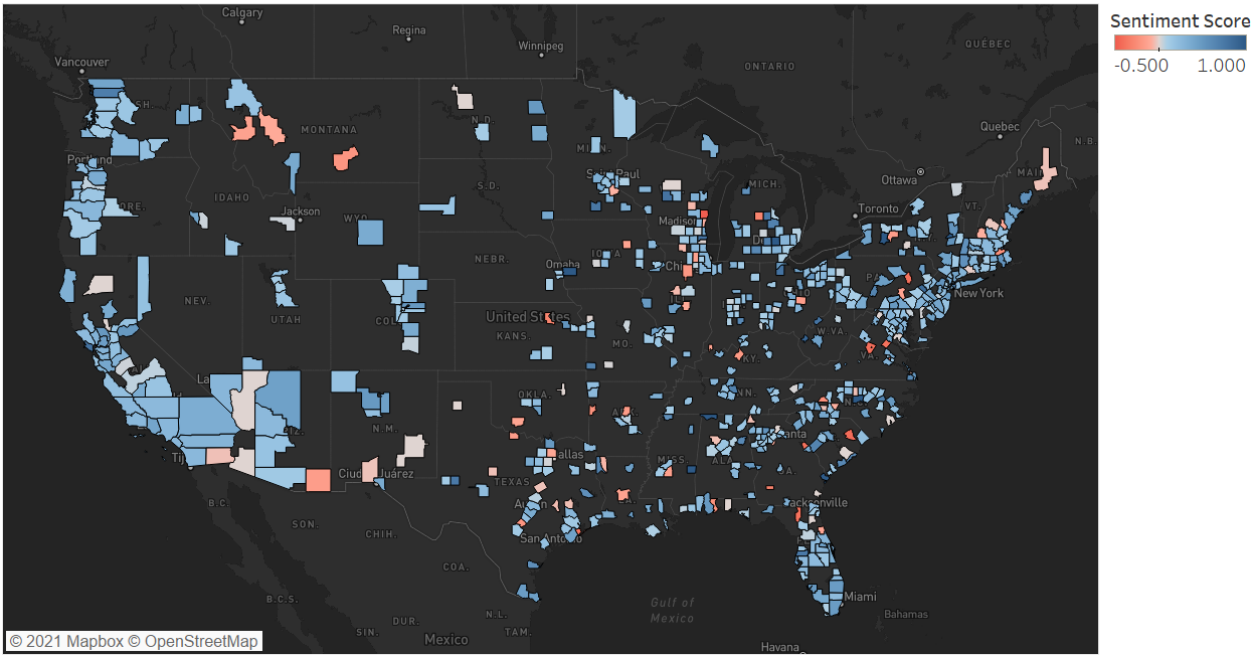
Price Sentiment by Region



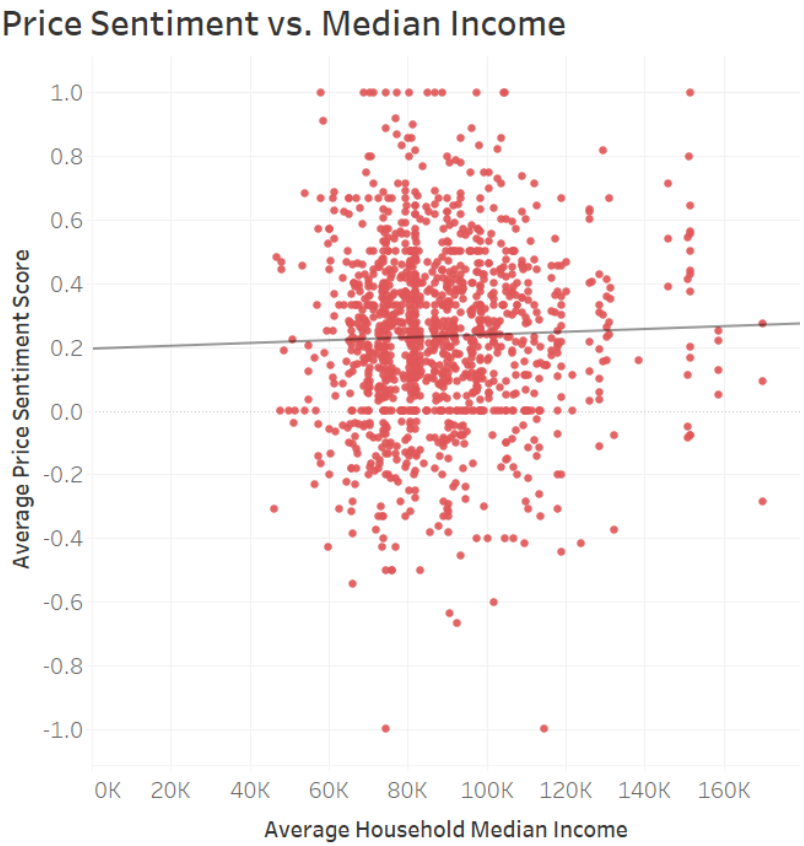
Observe that the Northeast has the most positive average price sentiment score, with the West, Midwest, and South following in that order. However, the latter three categories are all within 0.04 score of each other, while the Northeast has an approximate 0.05 lead over the second-highest scoring region.

Furthermore, we can group the locations by county. Here is where we incorporate the average median income data.

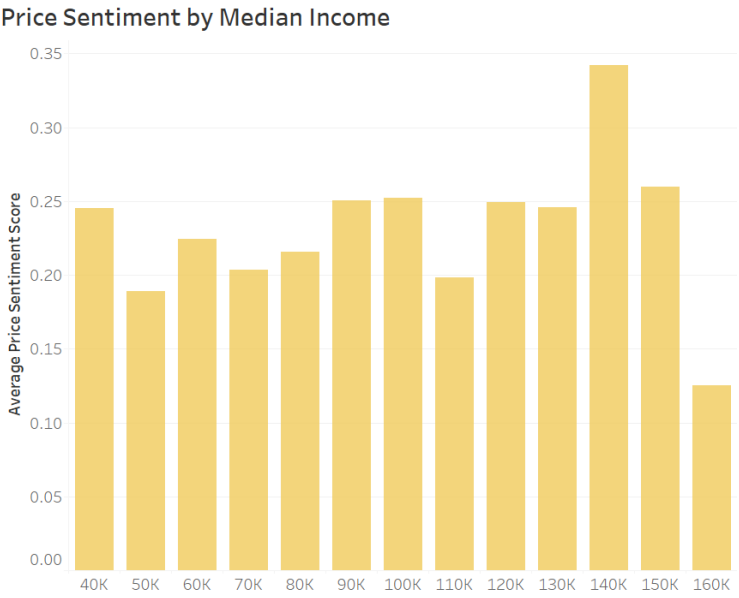
Counties Map of Price Sentiment and Median Income



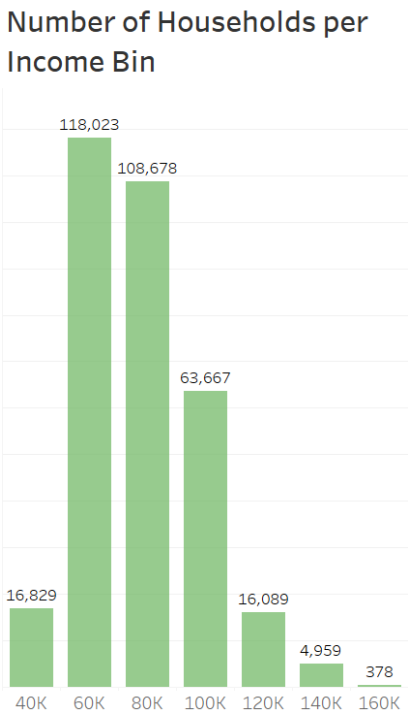
That's helpful, but we want to see if there's a trend between our price sentiment and household median income. Let's plot this and see if there's evidence of Target's dynamic pricing system.



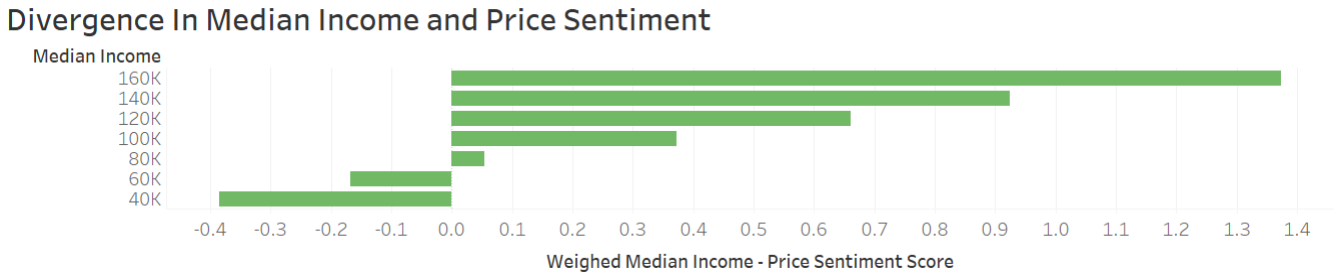
This makes sense with the pricing system. Since Target wants to cater their prices to each neighborhood, we expect price sentiment to stay relatively constant across different neighborhoods and income brackets, which is what we see.



We can see this further here, with the distribution being relatively uniform. The highest price sentiment score is in the $140k median income bin.



We can also look at how many households are within each income bracket. We see the distribution is right-skewed, with $60k-$70k being the mode of the distribution.



Our last step was to look at the difference between weighed average median income and average price sentiment. In order to do this, we first scaled the median incomes on the same scale as the sentiments. Then, for each county, we calculated the difference between these two values and then aggregated the counties by income bracket.

We see that both ends of the income brackets have higher differences, with the relative middle $80k having the lowest difference. As median income deviates from this center, median income and price sentiment increasingly diverge in both income directions. However, it is interesting to

note how as income decreases, price sentiment becomes greater than median income, and as income increases, median income becomes greater than price sentiment. This results in the two tailed distribution we see above. It is also interesting to note that the greater incomes have a higher disparity while the lower incomes have a lower disparity.

Summary and Further Investigation:

We've found evidence to support that Target uses this dynamic pricing system. This can be seen in the relationship between price sentiment and median income, as price sentiment stays relatively constant across different median income brackets.

We could also perform this same analysis for other topics in our Target location data, such as COVID safety, crowdedness, and wait time. Furthermore, we could look at other stores with dynamic pricing to see if the same relationships exist.

Sources:

- https://www.huffpost.com/entry/target-tracking-location-changing-prices_l_603fd12bc5b6ff75ac410a38
- https://www.latimes.com/business/la-xpm-2013-sep-24-la-fi-mo-ask-laz-target-prices-20130916-story.html