

# THASOS

## **Competitive Impact of Lower Prices at Whole Foods**

October 3, 2017

# Executive Summary

## Amazon Increases Pressure on Brick-and-Mortar

On August 28, 2017, Amazon closed a deal to acquire Whole Foods and immediately implemented price reductions to attract a broader customer base. After waiting for three weeks of live mobile phone location data, we used the Thasos Platform to quantify the competitive impact of the price reduction.

Our analysis covers a broad range of metrics--including new customer growth, attribution, loyal customer defection from competitors, and customer demographics--for customers of Aldi, Costco, Kroger, Publix, Safeway, Sam's Club, Sprouts, Stop & Shop, Target, Trader Joe's, Walmart, and Whole Foods.

## Key Conclusions

- ▶ **Foot traffic to Whole Foods increased 17% year-over-year during the week of the price reduction beginning on August 28.**
- ▶ **As of the week ending September 16, foot traffic decelerated to 4% year-over-year, but remained elevated relative to the three weeks preceding August 28.**
- ▶ **The largest percentages of Whole Foods' new customers during the week of the price reduction were regular customers of the following competing stores:**
  - ▼ **Walmart: 24%**
  - ▼ **Kroger: 16%**
  - ▼ **Costco: 15%**
- ▶ **Controlling for the size of each competitor's regular customer base, the following stores experienced the highest rates of customer defection to Whole Foods:**
  - ▼ **Trader Joe's: 10%**
  - ▼ **Sprouts: 8%**
  - ▼ **Target: 3%**
- ▶ **Customer Defection Rates remained elevated for all competing stores as of September 16.**
- ▶ **The new customers Whole Foods attracted with its price reduction were the wealthiest regular customers of the competing stores.**
- ▶ **The price reduction did not attract a lower income demographic or incentivize longer driving times to reach Whole Foods' stores.**

# About Thasos

Thasos Group is an alternative data intelligence firm founded at MIT in 2011 and headquartered in NYC. Thasos transforms real-time locations from mobile phones across the globe into objective and actionable insights on the performance of businesses, markets, and economies.

With the largest repository of high quality mobile phone location data after Google and Apple, Thasos provides the most powerful source of real-time data available today for measuring and forecasting economic activity across all industries.

Thasos uses the latest advances in machine intelligence, distributed computing, and privacy technology to convert billions of daily location events into accessible information that is easily consumed, understood, and acted upon.

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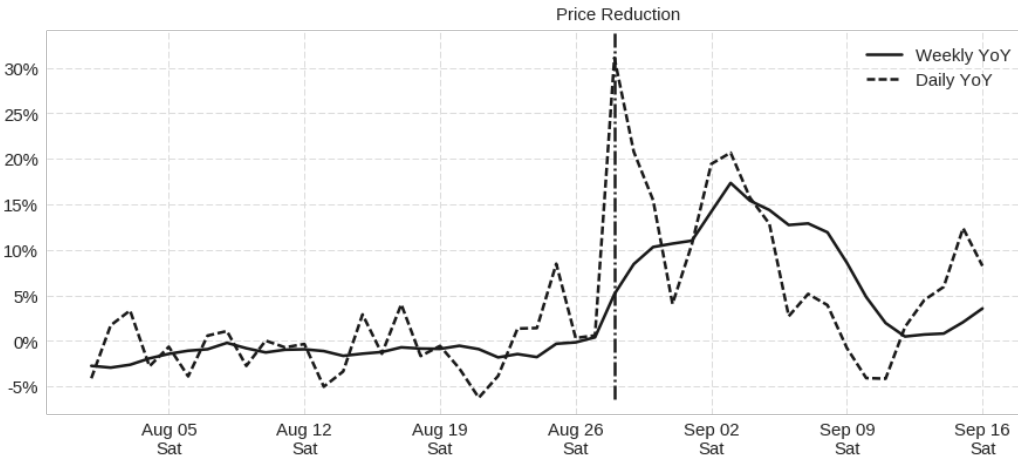
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# Customer Traffic To Whole Foods Increased 17% Year-Over-Year

In order to measure the change in foot traffic to Whole Foods in response to the price reduction on August 28, while also controlling for the impact of seasonality and Labor Day weekend, Fig. 1 shows the year-over-year ("YoY") change for daily and weekly rolling windows of foot traffic.

**For the week ending Sunday, September 3, the weekly YoY change in foot traffic to Whole Foods peaked at 17%. On August 28, the daily YoY change in foot traffic peaked at 31%.**

**Fig. 1: YoY Change in Foot Traffic for Whole Foods' Customers**



**Note:** The weekly rolling window is defined as a seven-day period of time that increments or rolls forward by adding one new day and simultaneously dropping the oldest day. The rolling window is plotted in terms of the YoY change relative to the comparable seven-day period in 2016.

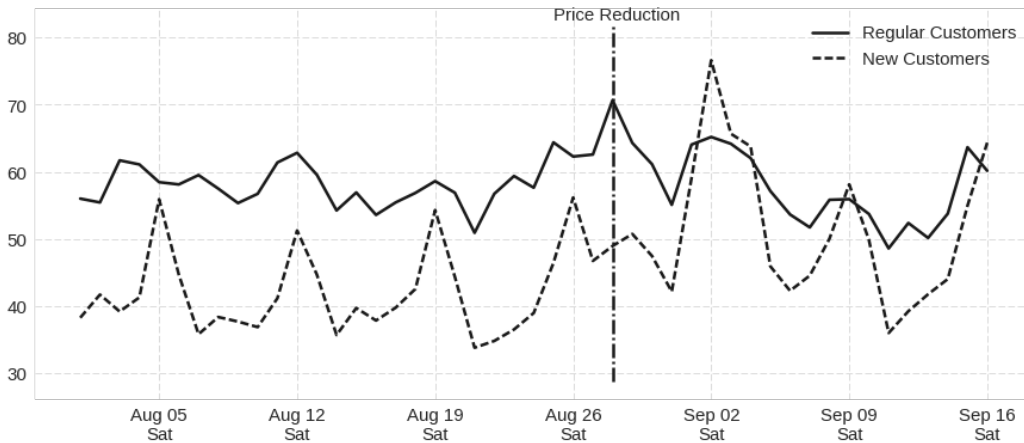
Unlike with sequential week-over-week comparisons, Labor Day (September 4, 2017 and September 5, 2016) and its associated weekend do not impact the 17% YoY change we calculated for the week ending September 3.

# New Customer Visitation Accelerates After Price Reduction

Fig. 2 shows the Thasos Foot Traffic Index on a sequential day-to-day basis for new and regular customers of Whole Foods. **For the week ending Sunday, September 3, average daily foot traffic for new customers increased 33% relative to the previous week ending Sunday, August 27. The same calculation for regular customers yielded 7%.**

**Significantly, foot traffic for new customers remained at elevated levels through September 16.**

**Fig. 2: Thasos Foot Traffic Index for Whole Foods' Customers**



**Note:** Regular customers are defined as those who shop at a given store at least twice per month. We fixed the regular customer base as of August 27, so no new customers converted to regular customers after August 27 in this plot.

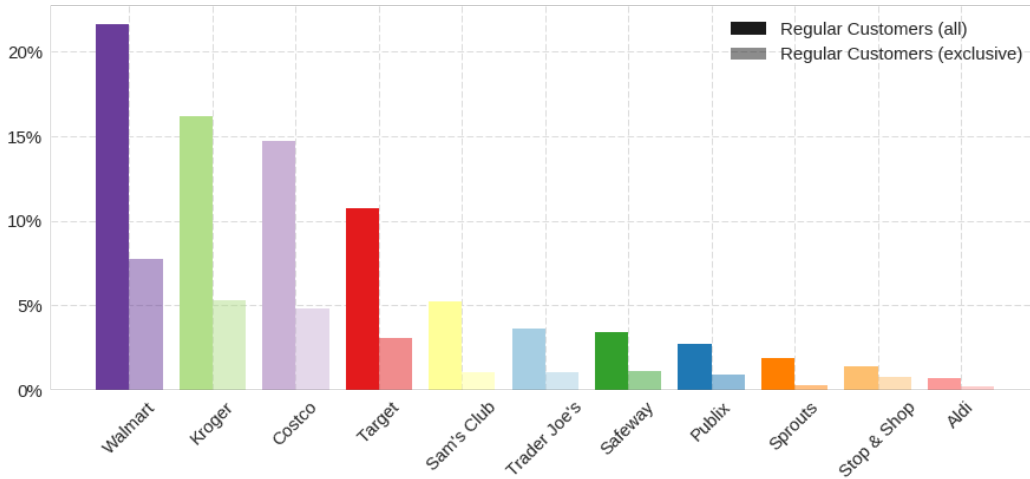
The y-axis represents a normalized index of foot traffic on a scale between 0 and 100. The values in this plot are sequential instead of YoY insofar as they represent the aggregation of all foot traffic on a daily basis.

# Walmart's Regular Customers were the Largest Percentage of Whole Foods' New Customers

Fig. 3 shows the composition of Whole Foods' new customers post price reduction in terms of the grocery stores at which those customers have historically shopped on a regular basis. **Walmart's regular customers accounted for 24% of Whole Foods' new customers during the week of the price reduction.**

However, because Walmart has a larger number of customers than any of the competing stores, Fig. 4 on the next page shows the competitive impact after normalizing the data for the size of each competing store's regular customer base.

**Fig. 3: Attribution for Whole Foods' New Customers**



**Note:** To calculate each of the attribution percentages, we divided (B) by (A) where (A) is the total number of Whole Foods' new customers during the week of the price reduction and (B) is the number of a given competitor's regular customers who shopped at Whole Foods during the week of the price reduction.

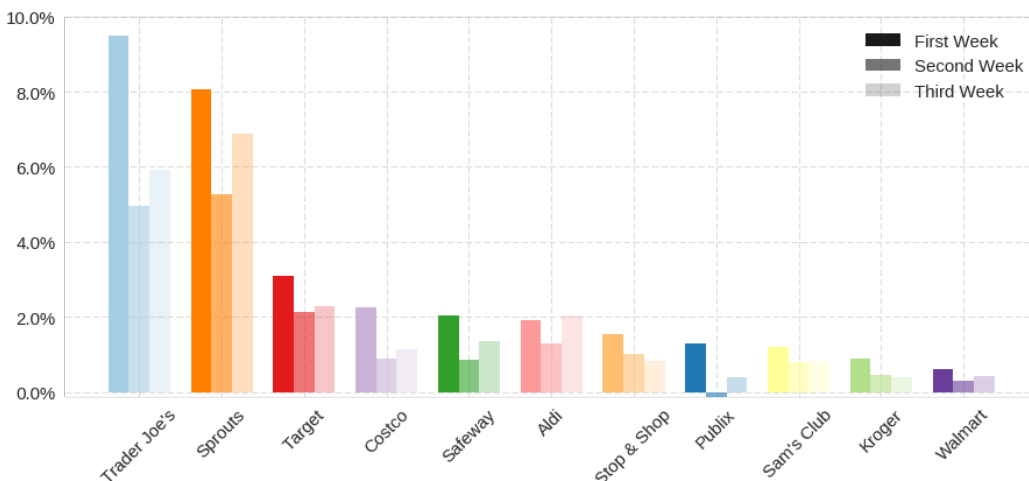
People who regularly shop at more than one competing store are counted once for each such store. For regular customers who shop exclusively at only one competing store, the shorter, lightly shaded bars represent the relevant attribution percentage. For example, considering all of Walmart's regular customers--both exclusive and non-exclusive--24% shopped at Whole Foods after the price reduction. However, only 8% of Walmart's regular customers shopped exclusively at Walmart before the price reduction and also defected to Whole Foods after the price reduction.

# Competing Stores Experienced Increase in Defection Rates

To better assess the competitive impact of the price reduction, Fig. 4 shows defecting customers from Fig. 3 as a percentage of the total regular customer base for each competitor. Because regular customers of competing stores occasionally shop at Whole Foods for no obvious reason, Fig. 4 isolates how historical customer defection changes in response to the price reduction. Specifically, the percentages below reflect the differences between customer defection during the three weeks after the price reduction and the week immediately before. See the note below for a formal definition of the Defection Rate used in Fig. 4.

**On average during the First Week of the price reduction (August 28 - September 3) relative to the week prior, nearly 10% more regular customers of Trader Joe's defected to Whole Foods each day. By the Third Week (September 11 - September 16), the average daily Defection Rate for Trader Joe's was still significantly elevated at 6%. At the other end of the spectrum, the same calculations for Walmart yielded 0.6% during the First Week and 0.4% during the Third Week.**

**Fig. 4: Defection Rate for the Competitors' Regular Customers**



**Note:** We define the Defection Rate as (A) the percentage of regular customers for a given competitor who shopped at Whole Foods during a specific time period after the price reduction minus (B) the same percentage for a comparable period before the price reduction.

The denominator used to calculate the Defection Rate is the total number of a competitor's regular customers who shopped at either the competitor's stores or Whole Foods' stores during the specified time period. This calculation means the Defection Rate is relative to the number of the competitor's regular customers who went shopping during the specified time period rather than the entire regular customer base.

For example, assume we want to calculate (A) for Tuesday. If 100 regular customers of Trader Joe's go shopping on this Tuesday, 20 of which go to Whole Foods and 80 of which go to Trader Joe's, then the percentage for (A) on this Tuesday would be 20%. If we calculate 10% for (B) in the same way for the previous day, Monday, the Defection Rate for Tuesday would be 20% minus 10% or 10%.

To calculate the Defection Rates in Fig. 4 for the First Week, we chose the week of the price reduction (August 28 - September 3) for (A) and the immediately preceding week (August 21 - August 27) for (B). The Second Week and Third Week correspond to September 4 - September 10 and September 11 - September 16, respectively.

Only competing stores within 20 miles of a Whole Foods store were considered for this analysis.

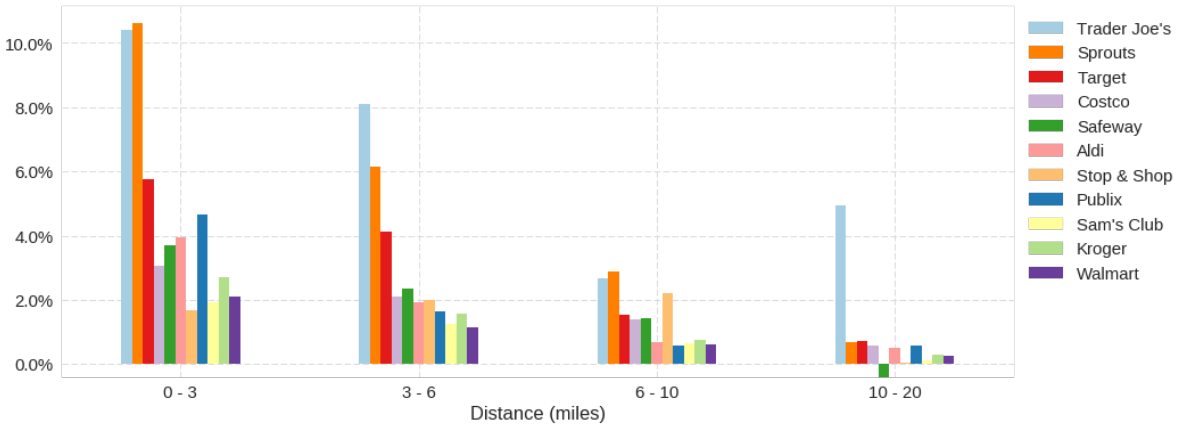
See also Fig. 8 in the Appendix for a daily time series of Defection Rates before and after the price reduction.

# Defection Rates Varied Significantly with Proximity to Nearest Whole Foods

We also analyzed the competitive impact of Whole Foods' price reduction after controlling for each competing store's distance in miles to the nearest Whole Foods. As expected, nearly all stores had higher rates of defection the closer they were located to a Whole Foods.

**However, Defection Rates for Trader Joe's stores remained strong even when they were located up to 20 miles away from the nearest Whole Foods.**

Fig. 5: Defection Rates Segmented by Distance from Nearest Whole Foods



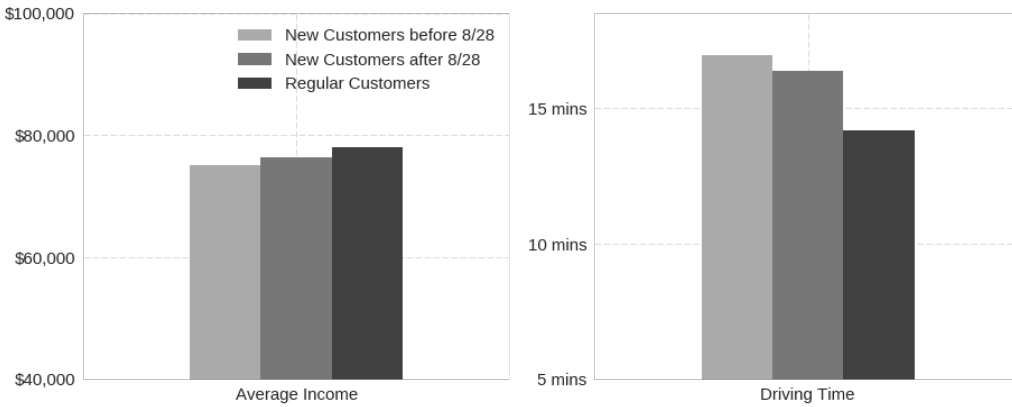
**Note:** To calculate Defection Rates segmented by distance, we first grouped all individual stores into their respective distance segments and then computed Defection Rates for each segment's regular customer base according to the procedure described in Fig. 4.



# Whole Foods Failed to Attract New Demographic

Counter to our expectations, demographic analysis of Whole Foods' new and regular customers did not reveal material differences. **The price reduction did not attract a lower income demographic or incentivize longer driving times to reach Whole Foods' stores.**

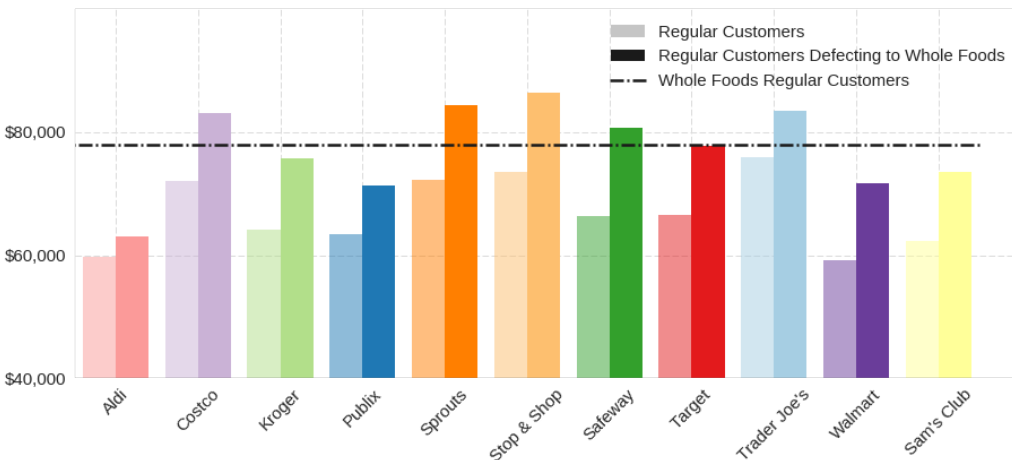
**Fig. 6: Whole Foods' Customer Demographics**



**Note:** To estimate income levels, we used the relevant census block data from the American Community Survey. To estimate driving times, we used Google's Maps API.

To help explain the above finding, we compared the income levels of each competitor's regular customer base to the subset of those customers who defected to Whole Foods. **As Fig. 7 shows, the defecting regular customers from each competitor represented the wealthiest segment--with income levels comparable to Whole Foods' regular customers--of their respective customer bases.**

**Fig. 7: Average Customer Income**

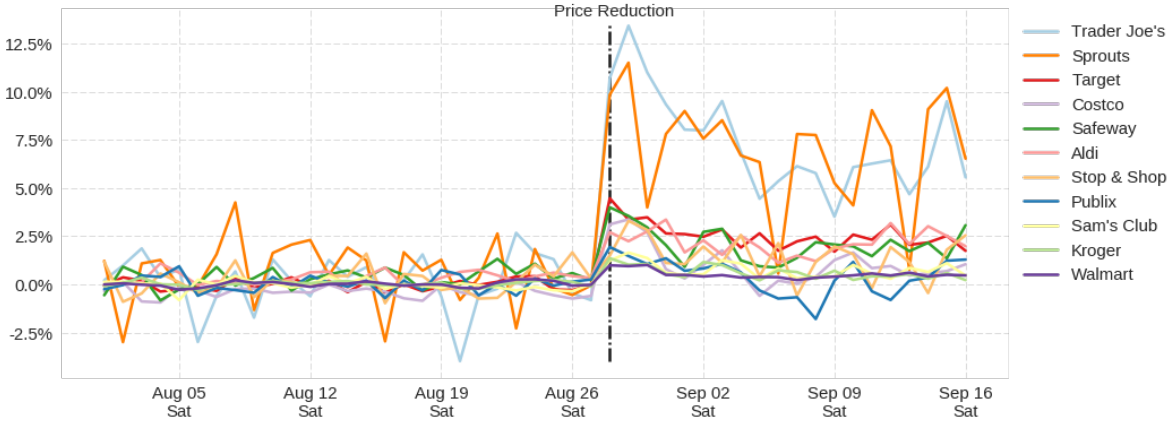


**Note:** Income levels were estimated with the same methodology used for Whole Foods' customers.

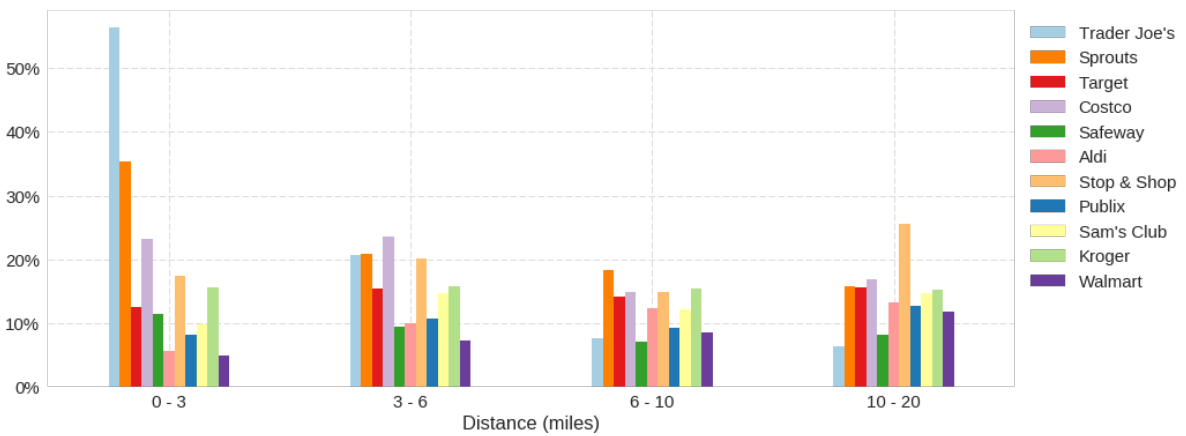
# Appendix

To assess the significance of the Defection Rates in Fig. 4, we compared Defection Rates on a historical basis. Fig. 8 shows a significant increase in defection on the day after the price reduction for all competitors. The plot also shows that defection has remained elevated for most competing stores in the weeks following the price reduction.

**Fig. 8: Defection Rates for the Competitors' Regular Customers**



**Fig. 9: Percentage of Total Stores Located in Each Distance Segment**



# Appendix

Table 1: Thasos Grocery Store Coverage by Company

Company name	Thasos geofences	Known company locations	Coverage percentage
Aldi	1,283	1,690	76%
Costco Wholesale Corp	503	508	99%
Food Lion	1,063	1,098	97%
Giant	303	366	83%
Hannaford	174	181	96%
Kroger Co/The	2,627	2,793	94%
Meijer	225	236	95%
Publix	744	1,208	62%
Safeway	700	1,301	54%
Sam's Club	599	661	91%
Smart & Final Stores Inc	257	313	82%
Sprouts Farmers Market Inc	274	274	100%
Stop & Shop	371	416	89%
Target Corp	1,571	1,816	87%
Trader Joe's	468	470	100%
Wal-Mart Stores Inc	3,769	4,741	79%
Weis Markets Inc	198	204	97%
Whole Foods Market Inc	390	444	88%

**Note:** All geofences referenced above are hand drawn and verified by Thasos' proprietary geofencing operation. We tag each geofence with helpful meta information, including the date it commenced operations initially and the date it closed, if applicable, so that we can compute year-over-year changes on a comparable basis. The coverage percentages referenced above do not include geofences from popular third-party databases.

Not all companies referenced above were included in this analysis.

## Legal

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