Uncovering Marketing Trends: A Statistical Analysis of Competitive Strategies in Online Stores Using PriceSpy Database

Abstract

This research paper analyzes the pricing trends and strategies used by online stores. Using data retrieved from the PriceSpy database, the study focuses on two stores, 1260 and 3303, to compare the prices of mobile speakers and cellphones, identify trends, and their pricing strategies. Visualizations and analytical methods using R software were employed to analyze the data, with the study finding that both stores displayed a similar downward trend in price between July 2015 and January 2017. Stores 1260 and 3303 have utilized opposing strategies during 2015 and 2017 while following the same pricing trend to that of the adjusted CPI.

1. Introduction and Background

Online marketing has a great impact on traditional marketing with its ability to attract the customers by providing an increased price transparency of products. As customers become more aware of the prices, they become more sensitive to the price changes. Customers are able to compare prices across multiple companies with a zero cost by using the Price Comparison Websites. The Internet shopper can within minutes search and compare prices and find the lowest price offered on the web. Hence the cost of searching for a lower price, within the Internet market, is very low (Svensson, 2006).

Thus, it results in an increase in pricing between companies competitively. If online pricing is fundamentally different from traditional retail, its spread could have a rising impact on the overall Consumer Price Index (CPI) (Klenow, et al., 2018).

In order to retain in the market and to retain the customers, retailers have to adjust their Pricing Strategies accordingly. In anticipation of the impacts of online consumer reviews, the firm should adjust its pricing strategy according to the customization degree of its product (Li, et al., 2020). The objective of this paper is to analyze the pricing trends in online stores and find the pricing strategies of the selected stores.

To achieve the objectives of this study mentioned above, different analytical methods and visualizations were used, which will be explained under Methods.

2. Methods
2.1 Objectives

The objectives of this study are to compare and contrast the prices between selected stores and uncover trends and possible strategies used. More specifically, they can be specified as follows:

a) Price comparison of mobile speaker and cellphone products between stores 1260 and 3303

b) Identifying strategies by comparing price trends against adjusted CPI

In order to achieve these objectives, a data subset was chosen as explained in the next section.

2.2 Data Collection

The data chosen is a subset of the dataset of PriceSpy Sweden, containing records of variation in price and Consumer Price Index (CPI) adjusted price over select stores in Sweden. The process of data selection is shown below:
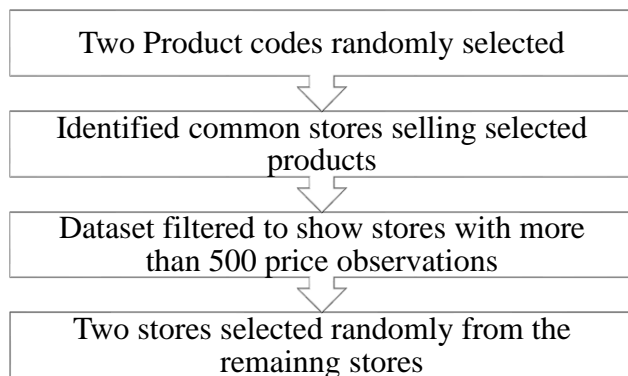
Two Product codes randomly selected

Identified common stores selling selected products

Dataset filtered to show stores with more than 500 price observations

Two stores selected randomly from the remainng stores

Figure 1 - Process of data selection

The selected two stores are 1260 and 3303, which have the following levels price observations shown in figure 2. It can be noticed that the selected stores have recorded the most price observations out of all stores.

Figure 2 - Price observations of selected stores

Table 1 below further summarizes the chosen dataset (for Cell Phones and Mobile Speakers) and its specifics.

Detail	Data
Dataset name	dataset
Dataset size (rows)	1654657
Chosen products	Cellphone, Mobile Speaker
Population dataset duration	2013-01-30 to 2017-02-25
Sample dataset duration	2015-08-05 to 2017-02-25
Price summary of cellphones	
Minimum value	999
Maximum value	3123
Price summary of mobile speakers	
Minimum value	299
Maximum value	739

2.3 Data Analysis

In this paper, the data were analyzed and visualized using R, specifically with the use of packages: magrittr, gridExtra, and libraries: ggplot, ggplot2, data.table and dplyr.

The next section contains the visualizations used to compare and contrast the prices between selected stores, based on the objectives mentioned in section 2.1.

3. Results and Discussion

3.1 Price Comparison of products between stores

Figure 3 shows the price comparison of the mobile speaker and cellphone products between stores 1260 and 3303.
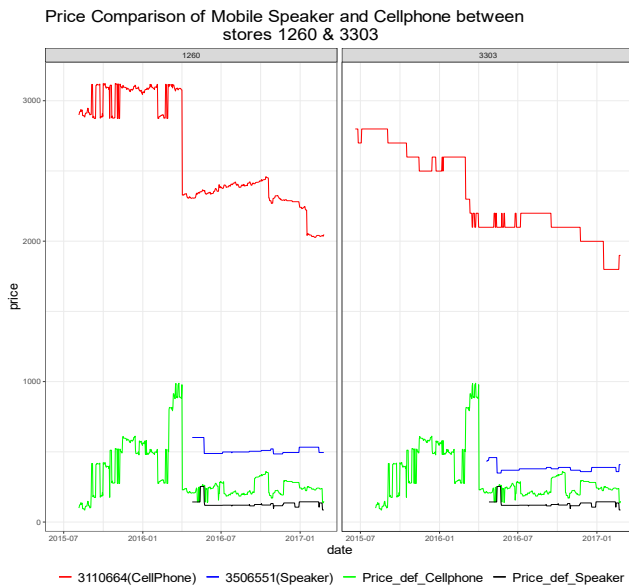

Figure 3 - Price comparison of mobile speaker & cellphone

It can be observed that both stores display a similar downward trend of price between July 2015 and January 2017. Store 1260 has continuously sold the cellphone at a relatively higher price than store 3303, and the same pattern is noticed for the mobile speaker product. The data indicates that store 1260 has launched the cellphone product to the market later than store 3303 but positioned its price higher from the beginning. Both stores have launched the mobile speaker at approximately the same point in time.

It can also be noticed that both stores have significantly dropped their prices for both products between January 2016 and July 2016, however, it does not seem to be a strategic move from either store, rather a reaction to a possible change in the economic ecosystem which has not been investigated in this study. A detailed look into the steep fall in price reveals that store 3303 has reacted by dropping the price first, followed by store 1260. This is confirmed by the observed highest price differences of 989 and 253 seen in table 2 below.

	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
summary_Cell	85	209	262	330.7180	416	989
summary_speaker	86	119	121	129.7231	136	253

Table 2 - Summary statistics of price difference between stores

From table 2, it can also be said that while store 1260 has positioned its price for the cellphone higher than store 3303, towards the beginning of

2017 the price difference between store prices deviates far from the mean (330.7) and closer to the minimum price (85).

Moreover, Since the launch, the price of store 1260's cellphone product shows more variation compared to store 3303 until the price fall. Store 3303 has maintained steady prices for longer periods of time. It may be possible to speculate that after the product launch, store 1260 was testing a strategy of positioning higher and lower prices within a certain range to identify their best way forward.

Comparatively, the mobile speaker product seems to show no significant variation for either store, except for a small price fall due to the previously assumed economic situation.

3.2 Identifying strategies using price trends against adjusted CPI

Figure 4 displays the comparison of variation in trends for product price against adjusted CPI.
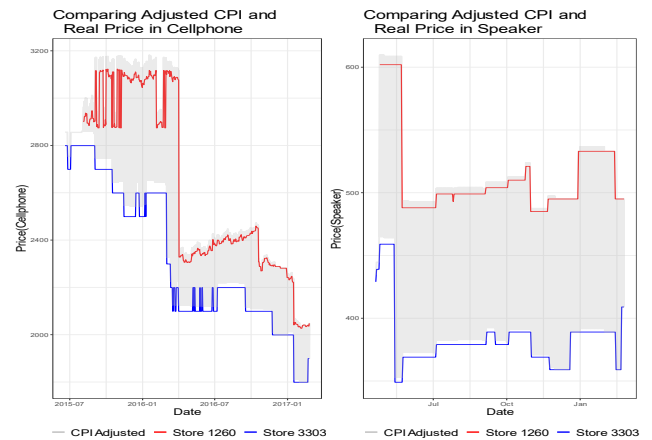

Figure 4 - Adjusted CPI vs product prices of stores 1260 and 3303

Figure 4 shows that store 3303 has utilized a consistent strategy of placing their price point below the adjusted CPI for both cellphone and mobile speaker products. Store 1260's strategy has been to place their price point close to the maximum the adjusted CPI for both cellphone and mobile speaker products. This strengthens the deductions about price positioning of the stores and trends made in section 3.1 and confirms that store 1260 has utilized a strategy of selling the product at a higher price than the CPI, while store 3303 has chosen to sell the product at a price lower than the CPI. However, as this study only considered two stores, it cannot be said whether this price positioning was done due to a direct competition between store 1260 and 3303. Figure 5 and 6 below reinforces the point about the above-mentioned strategic move.
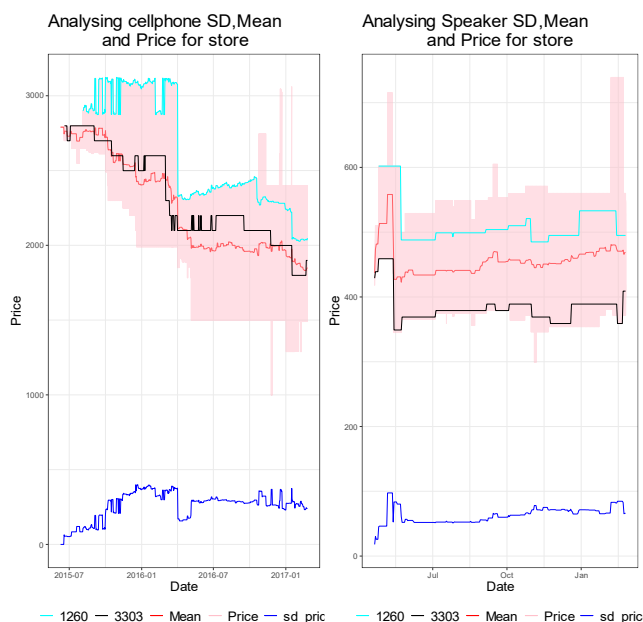
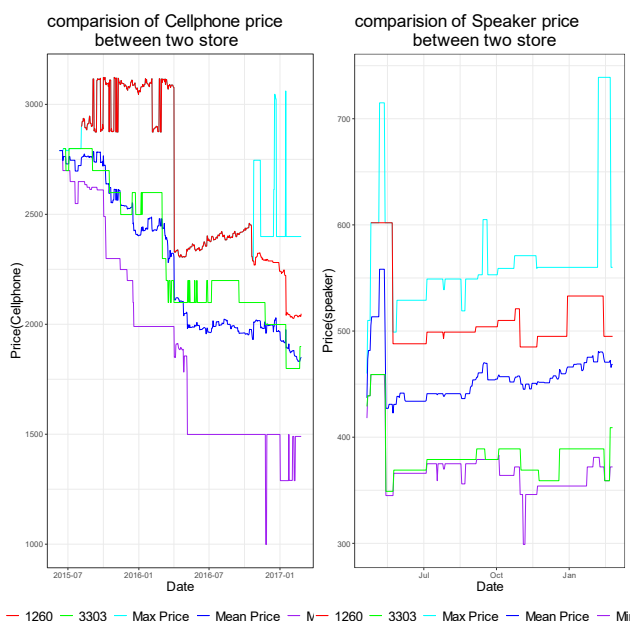Figure 5 - Cellphone price of stores 1260 and 3303 vs mean of population

Figure 6 - Min, Max, Mean of products in population vs prices in stores 1260 and 3303

Both figures indicate that store 1260 has positioned its price for cellphones above the mean price for all stores in the dataset and from figure 6. It can be seen that store 1260's price is in fact the highest in the market until towards 2017. On the other hand, store 3303 has resorted to placing its price for the cellphone product relatively closer to the mean from the launch until the discontinuation of the cellphone product.

What is noticed immediately from figure 5 about the mobile speaker is the contrast in strategy store 3303 has used when placing its price. Instead of positioning close to the mean price as was in the cellphone, store 3303 has placed its price for the mobile speaker below the mean price and much closer to the minimum price of the market (figure 6), consistently throughout the duration of study. Store 1260, however, has used a similar strategy to that of the cellphone, where it has positioned the price for the mobile speaker above the mean price for the product, but not necessarily close to the maximum price of the market.

4. Conclusion

In conclusion, this study found that stores 1260 and 3303 stores had a similar downward trend of pricing between July 2015 and January 2017, and store 1260 continuously sold cellphone and mobile speaker products at a higher price than store 3303. The study also revealed that both stores had significantly dropped their prices between January 2016 and July 2016, possibly in response to a change in the economic ecosystem. It can be said that these two stores have utilized opposing strategies during 2015 and 2017 while

following the same pricing trend to that of the adjusted CPI.

5. *References*

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