Introduction

In the past, we looked at the impacts of special discounts and promotions in the soft drink market on a superficial level. Now, as we attempt to dive deeper into marketing strategies and tools, the goal is to achieve a deeper understanding of the intricacies of pricing and advertising. Therefore, in the following report, we build sales-relative models for different tools of marketing and pricing policies. In this endeavor, we limit the observed market to the biggest players in the game, Coca Cola, and Pepsi. Firstly, we will get an overview of the general market. Afterwards we go on with an exploratory data analysis, inspecting different display and featuring activities, comparing, and combining them with market and price settings. We then verify the models we assume to describe the connections between the inspected dimensions best and draw conclusions about how to effectively market in different scenarios. Our focus will be the impact of promotional uplift as a response to marketing tools, and the price elasticity as a measure of reactions to price changes. To simplify referencing different magnitudes of price sensitivities across customers, we shall define them now. From here on out, customers with price elasticities between 0 and 1 percent are considered "indifferent"; 1 to 2 percent "marginally price sensitive"; 2 to 4 percent "price sensitive"; and anything above 4 percent is labeled as strongly price sensitive.

Hypothesis

The most general analysis that one can run produces a linear function between our target variable (volume sold, also known as liters), and the price of products in the market.

Intercept	4.66***
Log (Price per liter)	-1.76***

Table 1 – general regression

H1: This confronts us with the intuitive truth that prices and sales move in opposite directions. Furthermore, not all regions or markets are the same. Following this, we split up the general price sensitivity of the "whole market" to the actual markets for which we have data. These markets are two-fold, one in Eau Claire and one in Pittsfield. The first look into the general shopping behavior of the customers in these two markets shows that both groups of customers are close to the upper bound of our marginally price sensitive crowd.

H2: The two markets are heterogenous in terms of their reactions to sales based on price and marketing settings.

Intercept	4.84***
Log (Price per liter):Eau Claire	-1.69***
Log (Price per liter):Pittsfield	-1.91***

Table 2 – general regression split by market

Already, we see a difference in price elasticities for soft drinks. Our second focus, the promotional uplift, is assumed to have different effects on customers of differing markets as well. As we go into detail, we will prove this hypothesis for different sorts of products. For now, the discrepancy shown warrants further investigations for both markets, recognizing their need for individual modelling.

H3: Promotional uplift have different effects in different markets

At this point, further splits in our data are necessary. We can no longer pretend equality of brands or markets, and even the amounts of product bought are relevant for insights into the

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customers behavior. For example, it does not make sense to try selling someone a week's worth of Pepsi supply for a whole family, if they drink one bottle every month.

Our first stab at discovering the intricacies of the different markets revolves around the different interactions between "market" (essentially location/region) and the diet and sugar variants of Coca Cola and Pepsi, combined with feature and display activities. In this scenario, we chose the market leading volume, which is the 12-can-package.

For this purpose, we convert our dataset to market-level dataset, by merging the different stores by year, week, and product attributes. This helped us in generating a macroscopic view of the data.

The difference in market coefficients (table 3) between Coke and Pepsi results from Coke selling more volume in general, which bleeds over into the chosen volume category. Regarding the price elasticity, which is denoted by coefficients for the "price per liter" variable, we see that customers in Eau Claire are way more price sensitive than they are in Pittsfield. Surprisingly, the effects of promotion on Pepsi purchases do not outweigh the general public preference towards Coke in terms of overall sales, but customers who buy Pepsi tend to react positively way stronger to promotion than Coke customers. Note here that statistically insignificant variables were kept in this model to compare both marketing methods we observed, e.g., displays and features. There is a way larger and statistically more significant impact from displays on sales than there is from features. Regarding features, it is noteworthy that there was no advertising done for small bottles, no matter if Pepsi or Coke.

Furthermore, the particular differences in price elasticities compared across brand construct the impression of biased customers. Price sensitivity towards Coke is lower than towards Pepsi in Eau Claire, whereas in Pittsfield, Pepsi products face a lower price elasticity. This implies that there a more habitual Pepsi customers in Pittsfield, same as there are for Coke in Eau Claire. Supporting this hypothesis are the total sales by brand for both markets. There were equal amounts of Pepsi sold in Eau Claire and Pittsfield, whilst Diet Coke, Coke Classic and Diet Pepsi all sold way more in Eau Claire. This difference in sold volume shows that Eau Claire has a way larger market for soda in general. This, in turn, reinforces the hypothesized bias towards Pepsi in Pittsfield.

We would further like to investigate the 24-Cans-Packaging, since it generates 29% of the total revenue in three years. Regarding Pepsi and diet Pepsi both the markets have almost same contribution to the revenue. Looking at Coke, Eau Claire contributes to more coke 24-cans-pack sales, but it has comparatively higher price sensitivity and low promotional activities than Pittsfield. Seems like peoples' preferences for Coke surpass their price sensitivity towards it in Eau Claire. Additionally, the population seems to be indifferent to the price change for the brands in both market when it comes to 24-cans-pack.

Further, people are price sensitive for 2 liters bottles, with 1 % increase in price resulting on average 2% decrease in 2-liter bottle sales for all brands and market setting. Only Pittsfield is contributing to the promotional activity of 2-liter bottles.

Additionally, both markets have very low-price elasticity for 600 ml Coke bottles, meaning both markets are indifferent to 600 ml cola bottles but are price sensitive towards 600 ml Pepsi bottles. The analysis shows that 1% increase in Pepsi 600 ml bottle would decrease the sales on average by 2%. No promotional activity is observed for 600 ml bottles in either of the markets.

Akanksha Saxena (613826),
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From the above analysis it can be seen that every volume behaves differently in different market and brand settings.

Price elasticity increases along volume. To the perfectly rational thinker, it would seem odd that the price elasticity for price per liter increases with the volume bought. This means if all prices per liter went up by one percent, 24-can-packages would have the biggest losses in sales. We assume this to stem from the visual impact of the prize tag with a larger number compared to tags for 12-can-packages or 2-liter-bottles. Overall, Pittsfield displays higher activities around large displays than Eau Claire, and Eau Claire, in turn, uses minor displays for all different brands.

	Pepsi Data	Coke Data
Non sugar in Eau Claire	5.62 ***	7.23 ***
Non sugar in Pittsfield	6.10 ***	6.99 ***
Sugar in Eau Claire	5.66 ***	7.12 ***
Sugar in Pittsfield	6.60 ***	7.37 ***
Log (Price per liter) non sugar in Eau Claire	-4.77 ***	-4.31 ***
Log (Price per liter) non sugar in Pittsfield	-1.91 ***	-2.79 ***
Log (Price per liter) sugar in Eau Claire	-5.34 ***	-4.45 ***
Log (Price per liter) sugar in Pittsfield	-2.32 ***	-3.02 ***
Display_all non sugar Eau Claire	1.41 ***	0.20
Display_all non sugar Pittsfield	1.71 ***	0.82 ***
Display_all sugar Eau Claire	1.33 ***	0.10
Display_all sugar Pittsfield	1.68 ***	0.96 ***
Display_all non sugar Eau Claire	-1.41 *	0.16
Display_all non sugar Pittsfield	-0.38	-0.64 ***
Display_all sugar Eau Claire	-0.39	0.35
Display_all sugar Pittsfield	-0.71	-0.73 **
N	628	628
R^2	1.00	1.00

*** p < 0.001; ** p < 0.01; * p < 0.05.

Table 3 – market level models

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Eyeballing Niche by Liters Sold!!

This macroscopic view of the data can be further investigated to verify the hypothesis (H1, H2 and H3) defined in the previous section by analyzing both the markets separately and comparing them.

From table 4 and 5, it is seen the market coefficient of 12-cans-package of each brand has highest impact on the liter sales in both the markets, despite them both being price sensitive. This can be attributed to high promotional activities for 12 cans in both markets for all the brands. Regarding the 24-Cans-package, the market coefficients of Coke classic and diet coke contribute to higher sales in Eau Claire than Pittsfield, whereas Pepsi and diet Pepsi contribute to higher sales in Pittsfield than in Eau Claire. This clearly shows peoples‘ preferences in Eau Claire towards Coke and it’s variant and towards Pepsi and diet Pepsi in Pittsfield.

As for 2 liter bottles the sales will decrease by 2.78% with every 1% increase in price in Pittsfield. Yet we can see that sales are high because of high promotional activities, which supersedes price sensitivity in this case. For 600 ml bottles people are indifferent to price changes and there is also not much promotional activity for them either in both the markets.

Furthermore, we regrouped the stores into three categories based on the revenue generated by them. The stores that generated revenue greater than $1 million were categorized as high performing stores, which might be supermarkets. Stores generating revenue between $0.5 million to 1 million in three years were labeled as medium performance and stores with less than $0.5 million were classified as low performance stores (which can be small shops). It is evident that high performing stores have higher impact on liters sold followed by medium and low performing stores. Additionally, the low performance stores have relatively good sales for only 600 ml bottle in Pittsfield and for 2-liter bottle in Eau Claire. This can be due to the distribution channel, where small stores do not prefer to sell big packages of soft drinks like 12 and 24 cans.

Furthermore, Eau Claire’s have higher sales of both 12-Cans- and 24-Cans-Package as compared to 12-Cans-Package and 2-liter bottles preferred in Pittsfield which is reflected in Eau Claire’s higher revenue. Since Cans are priced higher than 2-liter bottles, it leads to higher revenue generation for Eau Claire.

This analysis verifies our initial findings of Eau Claire’s inclination towards Coke and Pittsfield’s inclination towards Pepsi. Additionally, both markets prefer the 12-Cans-Package units irrespective of the brand and market setting.

Competitive price analysis for Coke classic and Pepsi in both markets

It is seen from Table 6 and 7, that both the markets have highest sales in 12-cans-pack of coke. 600 ml coke bottles generate relatively less sales compared to other packaging types for Coke classic in both markets. We can see that either no or relatively low promotional activities take place for 600 ml bottle in Pittsfield and Eau Claire respectively. Additionally, the liters sold for both 12 and 24-Cans-pack is lowest in low performance stores for both the markets. This can be attributed to the distribution chain, where small stores do not prefer to keep large packaging units.

Akanksha Saxena (613826),
Max Lilienthal (582147)

Taking Pepsi as the competitor for coke classic, the sales of coke classic will increase in Eau Claire for all packaging units except 12 cans, with significant increase in 600 ml bottles. There is no significantly large impact on coke classic sales in Pittsfield on increasing price of Pepsi.
The promotional activities both in terms of in-store product positioning and the advertisements is high in case of 12 and 24 Cans for both the markets. Still, the liter sales for coke in eau claire is seen to be low for all three categories of stores despite less sensitivity towards price change of 24-cans-pack. However, in Pittsfield, despite the strong price sensitivity for 12 and 24-Cans-pack, there seems to positive effect of promotional activities on sales it sales in high and medium performance store. This proves our third hypothesis to be true because high promotional activity for Coke classic is showing different characteristics in term of sales for different market setting. Hence, we approve H3.
This can also work as a proof that people in Pittsfield react better to promotions than in Eau Claire. Additionally, Eau Claire has biased towards Coke Classic which is evident from relatively lower price elasticity.
Generally, there can be seen positive impact of promotions on sales even for large packaging units despite people being cautious about price changes to the large units.

Competitive price analysis for Coke classic and Pepsi in both markets

The competitor for diet coke is taken to be diet Pepsi. for Eau Claire there is small but statically significant increase in sales of diet coke with 1% increase in diet Pepsi's price. Whereas the findings from Pittsfield are shockingly different from the expectations. with 1% increase in diet Pepsi's price the sales of diet coke would go down. This might be accredited to the preference of Pittsfield towards Pepsi over coke.

Pepsi and Diet Pepsi Analysis

This micro-level analysis helped us in completing the over-all picture at macroscopic view. We realized that Eau Claire is having higher proclivity towards 12 Cans purchase and low inclination towards buying plastic bottles irrespective of the brand being sold. 600 ml Pepsi bottle is rarely bought in Pittsfield, because they usually go for the 2 liters or Cans-pack.
Furthermore, coke classic and diet coke generate maximum sales from its 12-cans-package for both markets. This can be helpful in devising a marketing strategy for Coke brand. Coke can direct the marketing cost more towards promoting the 12-cans-pack than other types of packaging. Also, it is seen that brands are already consistently investing in 12 cans promotion across markets.

Impact of Weather on Sales of Soft Drinks

To analyze the seasonal effect of weather on soft drink sales we categorized our data as into two categories namely summer and winter. We took months from April to September as summer months and remaining months as winter months in both the markets. There was no difference in the statistically significant coefficients for summer and winter categories on the liter sales for all brands in both markets. This suggests that seasonality does not contribute to the „difference in sales" of the brands in different markets. The Maximum temperatures estimates were statistically insignificant, thereby concluding that weekly temperatures also did not have any impact of sales whatsoever.

Akanksha Saxena (613826),
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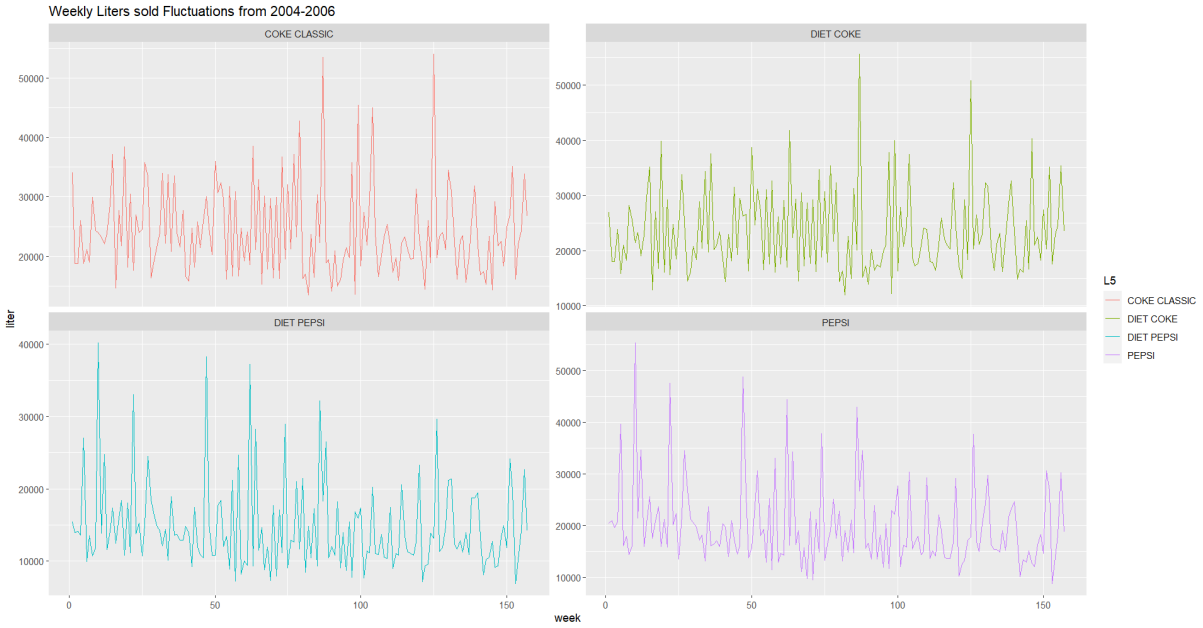

A plot for liters sold by week for the different brands supports this hypothesis. To verify, we also tried including average and/or maximum temperatures into various regression models, but they always came out marginal with less than 0.01% and were never statistically significant. Hence, their coefficients did not make it into any of our reports.

Akanksha Saxena (613826),
Max Lilienthal (582147)

	600ml	2 liters	12 cans	24 cans
Coke Classic	3.69 ***	4.05 ***	5.38 ***	4.37 ***
Diet Coke	3.86 ***	3.93 ***	5.51 ***	4.69 ***
Diet Pepsi	3.46 ***	3.12 ***	4.83 ***	4.12 ***
Pepsi	3.40 ***	3.34 ***	4.92 ***	4.20 ***
Store group „low “	-1.39 ***	-0.90 ***	-1.20 ***	-1.80 ***
Store group „medium “	-0.12 ***	-0.19 ***	-0.32 ***	-0.31 ***
Log (Price per liter)	0.35 ***	-1.50 ***	-3.09 ***	-4.43 ***
Display_all	-0.13 **	0.51 ***	0.72 ***	0.74 ***
Feature_all	-0.01	0.24 ***	0.12 *	0.35 ***
Display_all, Feature_all		-0.22 ***	-0.02	-0.25 *
N	3744	3743	3743	3744
R2	0.99	0.99	0.99	0.98

Table 4: Store Level Analysis of Eau Claire by Volume

	600ml	2 liters	12 cans	24 cans
Coke Classic	3.51 ***	5.34 ***	6.01 ***	3.85 ***
Diet Coke	3.39 ***	4.75 ***	5.58 ***	3.42 ***
Diet Pepsi	3.38 ***	4.59 ***	5.06 ***	4.49 ***
Pepsi	3.66 ***	5.39 ***	5.61 ***	4.87 ***
Store group „low “	-0.64 ***	-1.45 ***	-1.51 ***	-1.37 ***
Store group „medium “	-0.32 ***	-0.48 ***	-0.38 ***	-0.90 ***
Log (Price per liter)	0.63 ***	-2.78 ***	-2.99 ***	-3.02 ***
Display_all	-0.33	0.20 ***	-0.02	1.20 ***
Feature_all	0.10	0.26 ***	0.45 ***	0.87 ***
Display_all, Feature_all		-0.19 ***	0.44 ***	-0.35 *
N	3416	4396	4370	1586
R2	0.99	0.99	0.98	0.97

Table 5: Store Level Analysis of Pittsfield by Volume

Akanksha Saxena (613826),
Max Lilienthal (582147)

	600ml	2 liters	12 Cans	24 Cans
Store group „high “	3.55 ***	4.39 ***	5.62 ***	4.58 ***
Store group „low “	2.27 ***	3.78 ***	4.49 ***	2.84 ***
Store group „medium “	3.63 ***	4.21 ***	5.32 ***	4.34 ***
Log (Price per liter)	-0.66 **	-1.11 ***	-2.64 ***	-4.32 ***
Log (Competitor’s price)	1.11 ***	0.30 **	0.01	0.73 **
Display_all	-0.19 *	0.49 ***	0.57 ***	0.79 ***
Feature_all	-0.92 **	0.10	-0.04	0.59 **
Display_all: Feature_all		-0.14	0.13	-0.40 *
N	936	936	935	936
R2	1.00	0.99	0.99	0.98

*** p < 0.001; ** p < 0.01; * p < 0.05.

Table 6 – Competitor Analysis of Eau Claire by Volume

	600ml	2 liter	12 Cans	24 Cans
Store group „high“	3.78 ***	5.53 ***	6.32 ***	4.87 ***
Store group „low“	3.33 ***	4.09 ***	4.65 ***	3.20 ***
Store group „medium“	3.52 ***	5.18 ***	5.74 ***	4.66 ***
Log (Price per liter)	0.04	-2.73 ***	-3.84 ***	-4.46 ***
Log (Competitor’s price)	0.18	0.12	-0.67 ***	0.72 **
Display_all		0.08 *	-0.27 ***	0.74 ***
Feature_all		0.02	-0.02	0.53 **
Display_all: Feature_all		-0.11	0.50 ***	-0.42 *
N	1099	1099	1098	936
R2	0.99	0.99	0.99	0.99

*** p < 0.001; ** p < 0.01; * p < 0.05.

Table 7 – Competitor Analysis of Pittsfield by Volume

Akanksha Saxena (613826),
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The holiday specials

Everybody is familiar with the shopping craze that befalls people around certain holidays in the US. The two most prominent holidays are thanksgiving with its black Friday sales, and Christmas. We centered the following model around these special events to look for differences in consumer behavior compared to the rest of the year. When talking about special holidays in the US, obviously the 4th of July cannot be missed either. We also included the week from Christmas to New Year's Eve, as there might be some extra preparations for parties in addition to people who shop during the Christmas days. For clarification, we named the week leading up to, and ending with, the Christmas holidays pre-Christmas. Meanwhile, the week from Christmas to New Year's is labeled as Christmas.

Our results show once again a special importance of 12-can-packages, but the new find is that customers seem to actively drift away from 2-liter-bottles around these holidays in particular. We assume this to be rooted in the family-centered nature of the holidays. Organizing a drink for multiple family members is bound to be way more convenient using cans. Also once again, seasonality of the holidays does not seem to affect customer behavior, and whilst we split behavioral groups into the different markets before, the nationwide nature of the holidays makes this split obsolete for the subject at hand.

	Model 1
(Intercept)	6.25 ***
Log (Price per liter)	-1.14 ***
Display_all	1.01 ***
Thanksgiving:as.factor(VOL_EQ)0.3521	-0.18
Thanksgiving:as.factor(VOL_EQ)0.75	1.00 ***
as.factor(VOL_EQ)0.3521:july4	-0.71 ***
as.factor(VOL_EQ)0.75:july4	1.04 ***
as.factor(VOL_EQ)0.3521:pre_chris	-0.36
as.factor(VOL_EQ)0.75:pre_chris	1.07 ***
as.factor(VOL_EQ)0.3521:chris	-0.41 *
as.factor(VOL_EQ)0.75:chris	1.10 ***
N	4945
R2	0.53

*** p < 0.001; ** p < 0.01; * p < 0.05.

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Conclusions and marketing strategies

Summarizing both of these markets leads to different marketing strategies for Pepsi and Coke, as initially assumed. Coke is clearly the favorite in Eau Claire and therefore, an expansion in this market should be fairly easy through displays or features. Winning customers in Pittsfield would require a more aggressive pricing strategy because there the price sensitivity for Coke products is very high. When using displays, the focus should be on Coke Classic products, as their promotional uplift from display is way greater than for Diet Coke.
For Pepsi, their strength lies in a loyal customer base in Pittsfield, with especially lower price sensitivities compared to Coke products. Analogue to Coke in Eau Claire, Pepsi should focus on display activities where they are already strong, and weight their pricing policy as a heavier tool when trying to gain ground in Eau Claire.
Both can profit from holidays by especially advertising for their 12-can-packages but should not concern themselves with temperature related demand. Pricing decisions should also not be made based on competitor's prices, because they either had statistically insignificant or very small impact on customers' shopping decisions.

For the demanded reference: the first part, up to Table 3, was co-authored with inclination to Max; the second part, up to the "holiday specials", was written by Akanksha; the last part was authored by Max.

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