

Predictive Analytics Using SAS

Final Project Report

Submitted by

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Question: Are there price gaps and/or price thresholds that cause an unexpected impact on sales and/or velocities?

Top Margarine brands:

	Brand	Market_Share ▾	Sales
1	COUNTRY CROCK	32.257246101	2232097625.9
2	I CANT BELIEVE ITS NOT BUTTER	20.098087821	1372574982.9
3	BLUE BONNET	10.968083353	756975353.34
4	IMPERIAL	8.2693390313	577350262.47
5	SMART BALANCE	7.8820873041	535417502.95
6	EARTH BALANCE	5.1902138245	357043711.7
7	PARKAY	3.6600402274	250169464.43

The above table shows the Market shares and the sales for the top margarine brands aggregated over the years 2018-2022. The top 7 brands are *Country crock*, *I cant believe its not butter*, *Blue Bonnet*, *Imperial*, *Smart Balance*, *Earth Balance*, and *Parkay*. All brands other than the ones mentioned above are considered as “Other” Brand for later analysis. Out of the top 7 brands, four of them(*Blue Bonnet*, *Smart Balance*, *Earth balance*, *Parkay*) belong to FMCG with a combined market share of approximately 27%.

There are various factors that influence a customer's decision to choose a particular brand. Some of these factors include the average price of a unit, the presence of in-store displays, availability of price reductions or promotions, and amount of price reductions. These factors can significantly impact a brand's sales and market performance.

Estimating elasticity based on only sales and price using linear regression model:

Brand	Country crock	I cant believe its not butter	Blue Bonnet	Imperial	Smart Balance	Earth Balance	Parkay
Avg Price	2.34	3.53	1.26	1.29	3.87	5.68	2.68
Own Price elasticity	0.85	0.38	0.68	0.94	0.06	0.92	0.34

Own Price Elasticity is calculated as $elasticity = estimate * (mean_price / mean_sales)$.

Based on the given table, the own price elasticity for each brand represents the percentage change in weekly sales for every 1% change in the price of the brand's product.

- For Country Crock, a 1% increase in the price of their product would result in a 0.85% decrease in their weekly sales.
- For I Can't Believe It's Not Butter, a 1% increase in the price of their product would result in a 0.38% decrease in their weekly sales.
- For Blue Bonnet, a 1% increase in the price of their product would result in a 0.68% decrease in their weekly sales.
- For Imperial, a 1% increase in the price of their product would result in a 0.94% decrease in their weekly sales.
- For Smart Balance, a 1% increase in the price of their product would result in a 0.06% decrease in their weekly sales.
- For Earth Balance, a 1% increase in the price of their product would result in a 0.92% decrease in their weekly sales.
- For Parkay, a 1% increase in the price of their product would result in a 0.34% decrease in their weekly sales.

Therefore, this information can be used to inform pricing strategies for each brand. For instance, if a brand is highly elastic (i.e. has an own price elasticity greater than 1), then a small price increase could result in a large decrease in sales, indicating that the brand may need to be cautious about raising prices. Conversely, if a brand is inelastic (i.e. has an own price elasticity less than 1), then a small price increase would not result in a significant decrease in sales, suggesting that the brand has more flexibility to increase prices.

Question - Are there interactions across product attributes within the Tablespreads category that pose any risks and/or opportunity? Recommendation is to cluster items by product attributes including, but not limited to form, flavor, type, price tier, pack count, etc.

We have weekly IRI-POS for TableSpreads provided for over a period of 5 years along with product attributes such as Form Factor, Tier Value. Aggregate sales for each quarter and by each Brand, Count Value, Form Factor and Tier Value are computed. We also assumed that if there are no incremental sales in the corresponding quarter, there was no promotion during that quarter. Using this data we observed if there are any interactions across the product attributes within TableSpreads category that pose any risk and/or opportunity.

We have aggregated the 5 years of data for each brand along with product attributes such as Count Value, Ounces Value, Form Value, Tier Value, if there was any promotion during the 5 year period.

The REG Procedure	
Model: MODEL1	
Dependent Variable: marketShare	
Number of Observations Read	3493
Number of Observations Used	3493

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	19	1.27741	0.06723	926.02	<.0001
Error	3473	0.25215	0.00007260		
Corrected Total	3492	1.52956			

Root MSE	0.00852	R-Square	0.8351
Dependent Mean	0.00458	Adj R-Sq	0.8342
Coeff Var	186.01869		

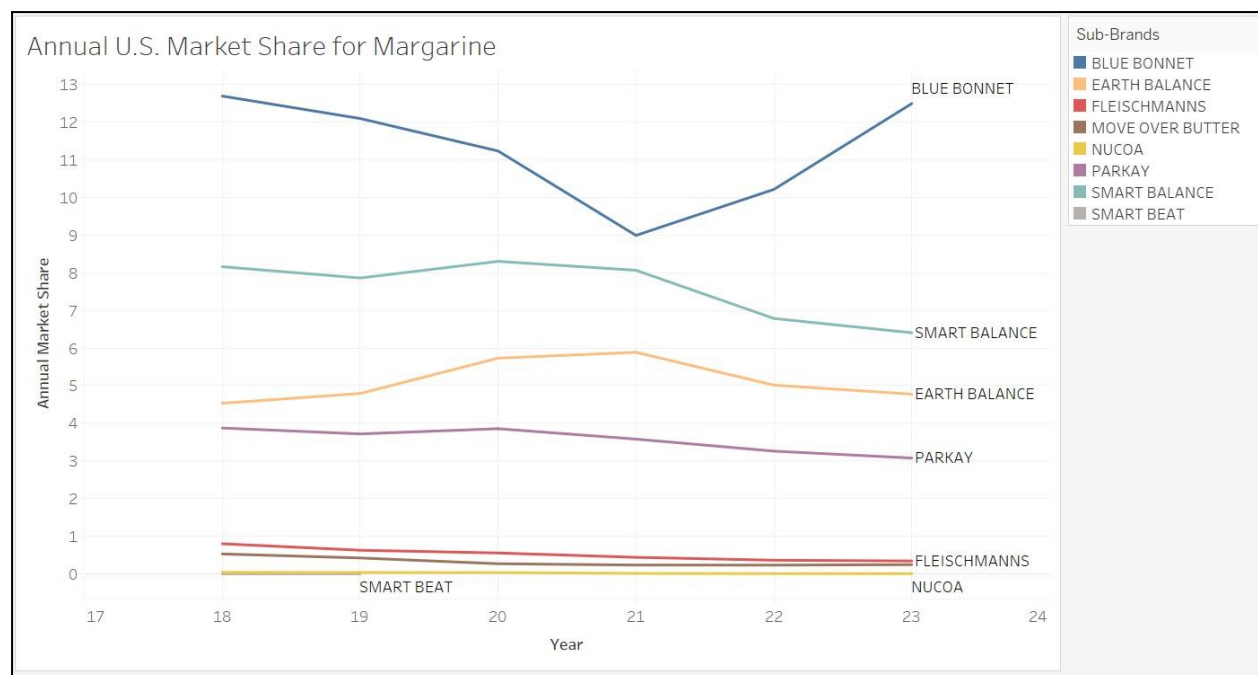
Parameter Estimates						
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t	Variance Inflation
Intercept	1	0.00111	0.00066578	1.66	0.0967	0
CountVal	1	7.381038E-7	0.00000895	0.08	0.9343	1.06548
OuncesVal	1	0.00000676	0.00001175	0.58	0.5648	3.94997
TotalDollarSales	1	4.79347E-10	4.14503E-12	115.64	<.0001	1.12470
AvgPriceperUnit	1	-0.00004337	0.00005913	-0.73	0.4633	1.87573
AvgPriceperVolume	1	-0.00001680	0.00002286	-0.73	0.4625	1.47083
AvgACVWghtdDistNoMerch	1	0.00029939	0.00001876	15.96	<.0001	2.09849
AvgACVWghtdDisttAnyMerch	1	0.00018622	0.00007914	2.35	0.0187	2.04171
Promo	1	-0.00043104	0.00041048	-1.05	0.2937	1.08018
Sticks	1	-0.00020480	0.00053481	-0.38	0.7018	2.58555
Tubs	1	-0.00009747	0.00039969	-0.24	0.8073	1.88622
GreatLakes	1	-0.00134	0.00058691	-2.28	0.0227	2.05294
MidSouth	1	-0.00094383	0.00060719	-1.55	0.1202	1.93385
Northeast	1	-0.00241	0.00057243	-4.22	<.0001	2.18603
Plains	1	0.00054446	0.00061654	0.88	0.3772	1.88662
SouthCentral	1	-0.00008740	0.00062998	-0.14	0.8897	1.83408
Southeast	1	-0.00177	0.00061372	-2.89	0.0039	1.90902
West	1	-0.00064757	0.00061569	-1.05	0.2930	1.86540
Tubs_OzVal	1	0.00002973	0.00001365	2.18	0.0295	3.34216
Sticks_OzVal	1	-0.00000505	0.00002241	-0.23	0.8218	2.54760

- Form Value such as Tubs or Sticks doesn't have any effect on the overall market share of brand.
- There is no interaction effect between sticks and Ounces Value.
- Although there looks like there is interaction between Tubs and Ounce Value, the main effect of Tubs is not significant.
- For every increase in Total Dollar Sales by \$100 million, market share increases by 0.047.
- Promo doesn't have much variation over period of 5 years and hence maybe the variable is insignificant.
- There is relative difference in geographic location market share and Great Lakes has lower market share compared to that of California. Similarly, Northeast and Southeast regions have lower market share compared to that of California.
- Overall, there doesn't seem to be any interaction effects between product attributes of brands over a period of 5 years on the market share.

Question - What is the optimal assortment for FMCG's products in the Tablesreads category?
Are there items where we have inefficiencies in product offering?

After preprocessing the data and analyzing Annual US market shares for 8 margarine sub-brands of FMCG between January 2018 and January 2023, we found following:

Margarine Sub-Brand	Marketshare (%age)					
	2018	2019	2020	2021	2022	2023
Blue Bonnet	12.70	12.10	11.24	8.99	10.21	12.50
Smart Balance	8.16	7.86	8.30	8.07	6.79	6.41
Earth Balance	4.53	4.79	5.73	5.89	5.01	4.77
Parkay	3.87	3.72	3.86	3.58	3.26	3.08
Fleischmanns	0.80	0.63	0.55	0.44	0.36	0.34
Move Over Butter	0.53	0.42	0.27	0.23	0.23	0.24
Nucoa	0.04	0.03	0.03	0.01	0.004	0.01
Smart Beat	0	0	-	-	-	-



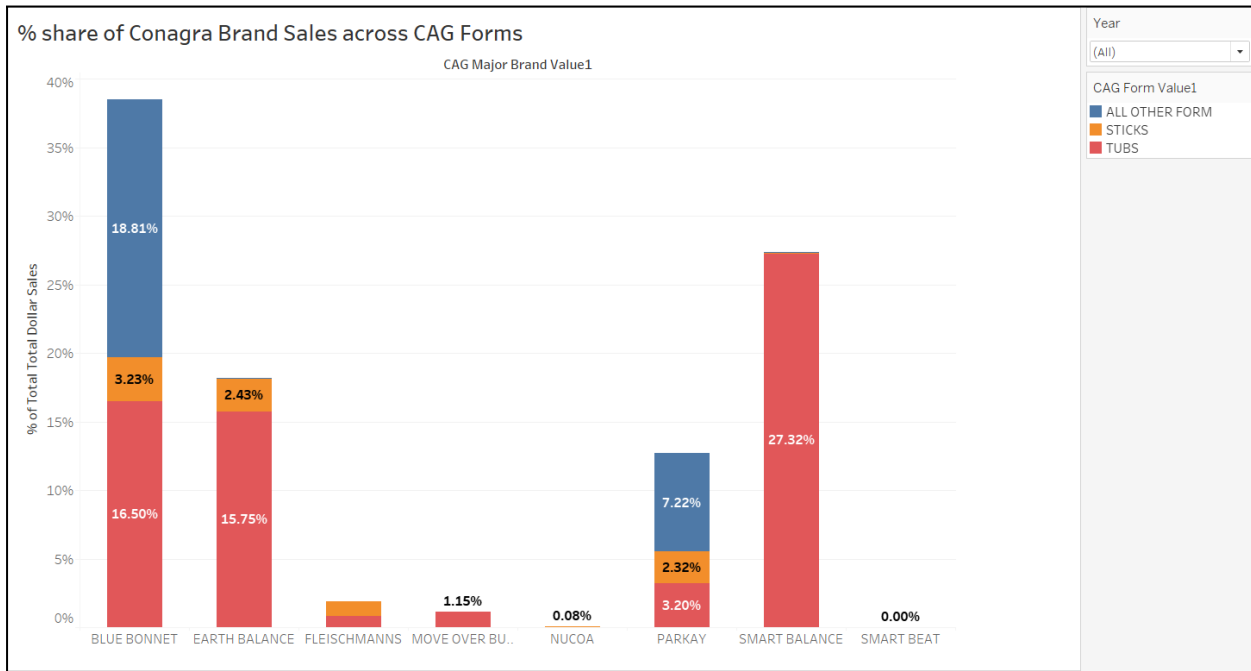
Key observations for FMCG Margarine sub-brands between January 2018 and January 2023:

1. Annual market share for Blue Bonnet has shown a positive growth after hitting lowest value of 8.99% in 2021.
2. The annual market share for Smart Balance has been declining since 2018. Promotions and improved marketing might give a boost to the sales of this sub-brand.
3. The annual market share of Earth Balance reached top market share of 5.89% in 2021 and has declined afterwards. Promotions and improved marketing might give a boost to the sales of this sub-brand.
4. The annual market share of Parkay has declined as well. Promotions and improved marketing might give a boost to the sales of this sub-brand.
5. The annual market share of Fleischmanns has declined as well. Promotions and improved marketing might give a boost to the sales of this sub-brand.
6. The annual market share of Move Over Butter has declined as well. Promotions and improved marketing might give a boost to the sales of this sub-brand.
7. The annual market share for Nucoa has stayed extremely low from 2018 to 2023. A major focus required on this sub-brand in order to improve the future market share.
8. The annual market share for Smart Beat was extremely low in 2018 and 2019. However, sales data was not found from 2020 onwards in tablespreads category. There was data for only one plastic squeeze bottle of 16 oz for 2018 and 2019. If plastic squeeze bottles of 16 oz didn't prove successful in the US market, then other size or price options might improve the sales.

Overall, Blue Bonnet has shown an upward trend in market share between 2018 and 2023. Other sub-brands Smart Balance, Earth Balance, Parkay, Fleischmanns, Move Over Butter, Nucoa and Smart Beat could perform better with improved sales strategies.

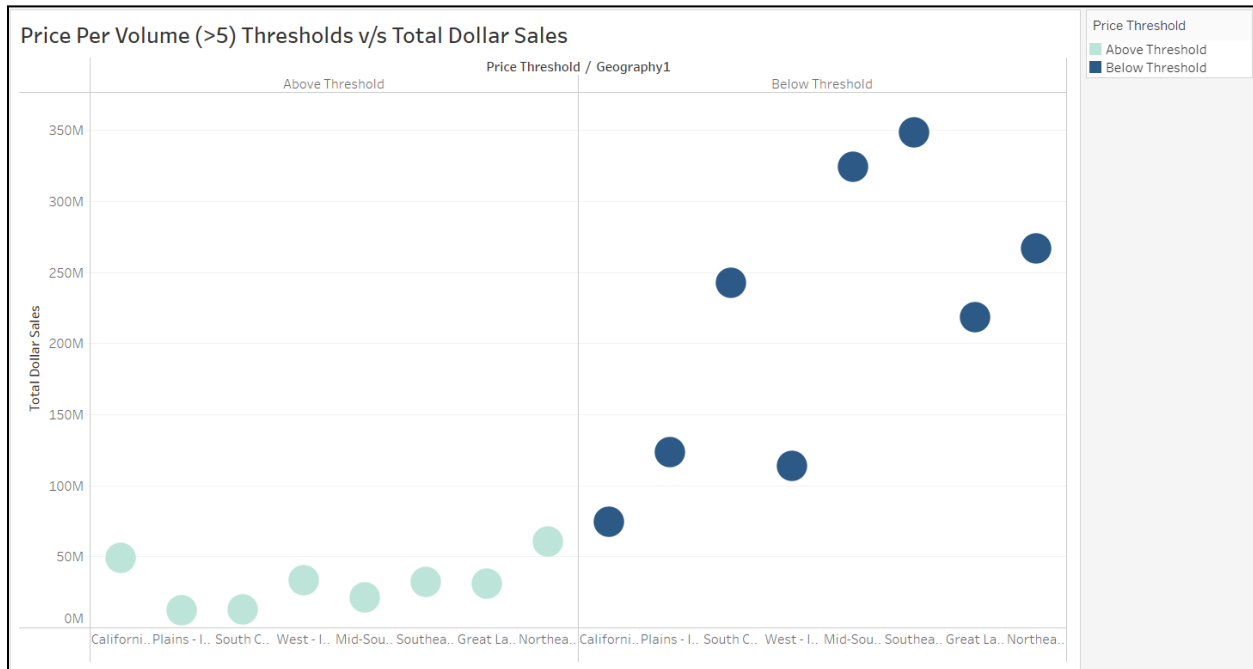
Market Share for FMCG Sub-brands across different forms:

The graph below shows the distribution of sales of the 8 FMCG Brands across different product forms in the Table Spreads category. We can infer that 64.74% of the brands’ sales come from the Tubs form, making it a popular choice amongst consumers. 26.03% of the sales is contributed by All Other Forms. The sales of Stick-type table spreads amounts to 9.23% of FMCG’s sales.



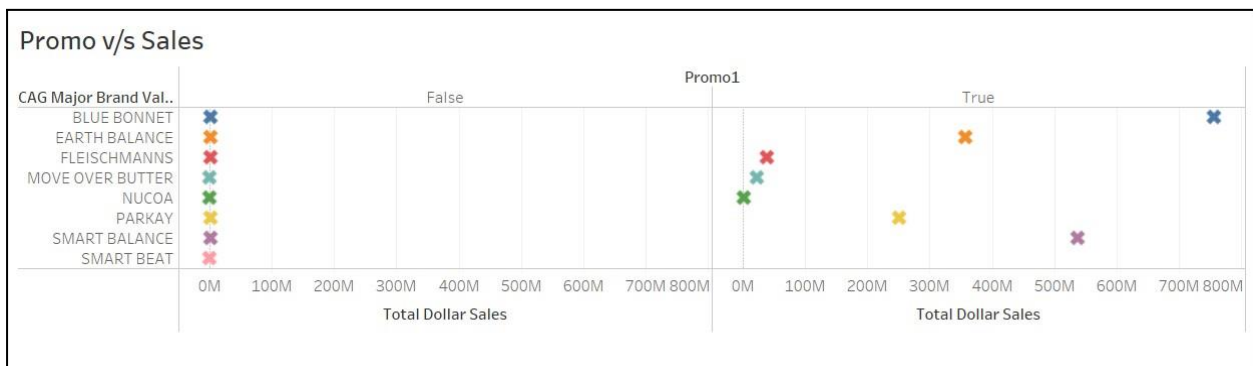
Sales across different geographical regions:

The visual below depicts the difference in sales of FMCG Table Spreads across various Geographical Regions. Here, we’ve incorporated an Average Price threshold of \$5. We can observe that the sales for products priced above this threshold have sales comparatively lower than those priced below \$5. This trend is constant across regions. The average total sales per region is 31,413 million USD for the products priced above \$5, whereas the products that are priced lower have averaged higher sales amounting to approximately 214,080 million USD.



Impact of Promotion on Total Sales by brand:

The visual below displays the impact of promotion by the brand on the total sales. It is quite evident that FMCG brands have better sales when they offer Promotional prices to the consumers.



References:

<https://support.sas.com/resources/papers/proceedings13/425-2013.pdf>