Project #3: Evaluating Sales Promotion Effects Using Scanner Panel Data

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Executive Summary

Sales promotion tactics can be utilized to generate sales in the short term but these are not always profitable. Using household scanner panel data, we modeled purchase incidence, brand choice, and purchase quantity, in SAS to further explore the effectiveness of three sales promotion tactics on the four provided detergent brands. Additionally, we explored price cut effects to estimate profit implications. Based on our findings, and considering the dynamicity of price promotion passing through from manufacturer to retailer, the promotion tactics should be applied case by case to the final customer. We concluded that the retailer should continue to implement price cuts and other promotion tactics to spur up Tide sales.

Introduction and Background

Sales promotions are considered short-term incentives that are given to customers, channel distributors, or a company's sales forces to increase sales. Consumer packaged goods (CPG) companies are the biggest spenders on sales promotions, and they account for 60-70% of the total marketing budget for these companies. For this analysis, we focused on laundry sales within a supermarket chain for Wisk, All, Tide, and Cheer.

As trade promotion spending in the CPG industry has steadily increased, manufacturers are rightly concerned about the proportion of this spending passed through to consumers by retailers. By setting different pass-through rates, we estimated the optimal margins for both retailers and manufacturers. We used household scanner panel data to analyze the utility of promotion tactics on expected sales and explore the profit implications for the both parties.

Data and Methodology

Datasets: Two SAS data files were provided.[1] *Deterg.sas7bdat* captured 19,157 observations of purchase incidence over 135 weeks. *Choice_det.sas7bat* was extracted from *deterg.sas7bdat* where a category purchase occurred. There were 178 households with a total of 3,124 purchases.

Models: A binomial logit model depicted category sales for the retailer, and a multinomial logit model describes brand choice among those who purchased laundry detergent. These models captured the implications of the retail price, price cuts, display ads, feature ads, and an indicator flagging whether the customer's last purchase was on promotion. Semi-log models examined the impact of different promotions on the amount of detergent purchased. We also tested the impact of different promotional tactics within an Excel worksheet to derive the expected impact on quantity increase and derive the greatest possible revenue.

Key Findings

Price cuts are less impactful than other promotional tools. Using binomial logit and multinomial logit models to predict incidence and brand choice, we created what-if scenarios with various combinations of promotional tactics. In each scenario, the chain would be better off using other promotional tactics instead of a price cut. Displaying ads are especially helpful at boosting detergent sales, and feature ads can also increase sales. Take Tide, for instance. On a

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[1] See appendix 1 for detailed information.

given week without promotions, the chain would sell about 190oz of Tide detergent. If a $0.97 price cut is offered and no other promotions are available, the chain would sell an estimated 352oz of the brand. More than half of all detergent sales that week would be for Tide (compared to 39% of detergent buyers picking Tide in the no-promotion benchmark). While this is an impressive 85% increase in Tide sales, the chain could increase brand sales by 180% by employing a Tide display ad instead. Consumers are also more receptive to feature ads than price cuts, and if Tide includes in a feature ad (with no other promotions), the chain will sell 439oz of the brand. Sales for the other three brands follow the same pattern, with display ads outperforming price cuts.[2]

It is important to note that a price cut on Tide is still more effective than any Wisk promotion tactic. Under the best-case scenario for the brand (i.e., display ad), the chain would sell about 330oz of Wisk. Under the worst-performing promotion for Tide (i.e., price cut), they would sell 352oz of Tide. Given Tide's higher price and therefore greater revenue, the chain has little incentive to invest in promoting Wisk; Wisk sales will consistently underperform the others.

Assuming that the retailer only cut the price of one detergent brand at a time, held no other promotions, and maintained a 100% pass-through rate, cuts increased gross profits by 20.5% when Wisk was on sale, 23.1% when it was All, 35.5% when it was Tide, and 20.1% when it was Cheer.[3] These promotions not only increased profits for the brand that was being promoted; they also increased gross profits from sales of all the other brands in the category. When Wisk was on promotion, gross profits from every other brand increased 9% (each), while Wisk sale profits increased by 86%, 6% when All was on sale, while All sale profits increased 126%, and 4% when Cheer was on sale, while Cheer sale profits increased by 72%. The only exception was Tide, whose price cuts only increased gross profits from Tide sales by 85% while lowering gross profits from sales of every other brand by 7% each. However, of all the brands, Tide's price cuts had the largest impact on retailer profits from detergent sales.

The effect of price cuts of each brand on the manufacturer's gross profit, assuming no other promotions and 100% pass-through rate, is seemingly functional. In purchase quantity models (semi-log models), we analyzed the effect of price cut on sales quantity for each brand individually. We again used a baseline which captured the amount of detergent sold without a price cut. We then used sales quantity data to calculate the profit implications on the manufacturer. Overall, we found that cutting the price on all four brands generates an increase in manufacturer profit. The brand with the greatest lift in manufacturer profit due to price cut was Wisk. Compared to the baseline, Wisk generated a 35.9% increase in gross profit for the manufacturer. Wisk also has the highest manufacturer profit margin per unit in the category. Following Wisk was Cheer, which generated a 24.4% lift in gross profit, Tide came in third place with a lift of 16.7%, and last was All with a 13.6% increase.

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[2] See appendix 2 for more information about each promotion tactic's implications.
[3] See appendix 3 for more information on profit implications for the retailer and manufacturers.

If the retailer uses a pass-through rate of 70% instead, retailer gross profit would increase; in fact, by roughly 59.9% for Tide. However, for manufacturers, the change is not as profitable. Though the 70% pass-through rate increases the manufacturer's gross profit by 14.3% and 4% for Wisk and Cheer compared to not having any price cuts, for All and Tide, they would lose money, having a negative profit change of -34.3% and -12.6%. Thus, a 100% pass-through rate results in profits for both retailers and manufacturers, but a 70% pass-through rate puts manufacturers at risk of a negative gross profit. The retailer may have another incentive to help the manufacturers retain their profits, but this consideration is beyond the scope of our research.

Conclusions and Recommendations

Each promotion tactic will increase sales, but the chain needs to consider the cost implications of these strategies. This analysis did not account for the costs associated with running the highly effective display ads, nor the expenses for publicizing feature ads. As discussed above, Wisk sales will continue to be weaker than the other brands, and price cuts for this brand are particularly helpful for the manufacturer, not the retail chain. Perhaps it is the brand name that is propelling Tide above the others. Even with its high price point, its baseline sales exceed the others, and promotion efforts are especially impactful for Tide.

As we apply the price cuts for Wisk, All, and Cheer, the promotional brand's retail profits will increase, which correspond slightly with the other brands. Tide is the notable exception. When applying a price cut of $0.97 for Tide, Tide retail profits increase by 85% while lowering retail profits from sales of every other brand by 7% each, indicating that customers tend to buy Tide over other brands when Tide is on promotion. A Tide price cut, for instance, increases our retail profit by 35% - a rate much higher than any other brand's price cut. Given these scenarios, the retailer should continue to implement price cuts and other tactics to generate Tide sales.

Lowering the pass-through rate is another way the retailer can capture some additional money. Retail profits for all brands increase when the retailer pockets 30% of the price cut. However, brand All is the most affected on manufacturer profit when the retailer applies a 70% pass-through, resulting in a profit loss of -47.9% on the manufacturer side. Understandably, this could negatively impact the retailer's relationship with Unilever and moderate promotions for their brands may be necessary. At the same time, Procter & Gamble may not want Tide to always be available at a price discount. Thus, we recommend a case-by-case basis agreement on pass-through rate for each manufacturer to maintain their business relationships.

Appendices: Tables, Exhibits, Figures

Appendix 1: Data Set and Descriptive Statistics

Variable	Description
PANID	An 8-digit ID number for a household in the IRI panel
WEEK	A numerical number representing the week according to IRI's system. (It ranges from 906 to 1040 in the data. week 906 refers to Jan. 6-12, 97)
INCID	= 1 if a household makes a category purchase in a given week; = 0 otherwise
CHOICE	= 0 if no category purchase incidence; = 1 if Wisk is chosen; = 2 if All is chosen; = 3 if Tide is chosen; = 4 if Cheer is chosen.
LCHOICE	Brand choice made on the previous category purchase occasion. Same coding as CHOICE.
VOLUME	Purchase quantity of the chosen brand, measured in ounces.
REGPR 1-4	Regular price for Wisk, All, Tide, Cheer in a given week, measured in cents/ounce.
PCUT 1-4	Amount of price cut for Wisk, All, Tide, Cheer in a given week, measured in cents/ounce.
DISP 1-4	= 1 if Wisk, All, Tide, Cheer has an in-store display promotion in a given week; = 0 otherwise
FEAT 1-4	= 1 if Wisk, All, Tide, Cheer has a feature ad promotion in a given week; = 0 otherwise
LBPROMOT	= 1 if the previous category purchase was made on promotion; = 0 otherwise
AVOL	A household's average purchase quantity in a previous period, in ounces
CASEID	An ID number for each choice occasion
BRAND	1 = Wisk; 2 = All; 3 = Tide; 4 = Cheer
DECISION	1 = the brand (as indicated by BRAND) is chosen; 0 = otherwise

Appendix 2: Quantity implications using each promotion tactic

	Wisk		All		Tide		Cheer	
Benchmark	63.44oz		94.70oz		190.42oz		109.36oz	
Quantity (oz)	Expected	% increase	Expected	% increase	Expected	% increase	Expected	% increase
Only price cut	118.23	86%	213.59	126%	352.44	85%	188.85	73%
Only display ad	329.91	32891%	372.30	293%	534.95	181%	445.06	307%
Only feature ad	133.88	111%	296.06	213%	439.50	131%	225.78	106%

Note that these expected quantities and percent-change calculations assume that only the given brand is on promotion at a time. For example, if the only promotion is a price cut for Tide, the expected quantity sold for the brand is 352.44oz or 3.52 100oz bottles. This table does not account for the impact of one brand's promotion on other brands' sales.

Appendix 3: Gross profit implications using a pass-through of 100% and 70%

Benchmark (No Promotion)	Wisk	All	Tide	Cheer	Category Total
Retailer Gross Profit	91.10	86.93	277.63	143.80	599.49
Manufacturer Gross Profit	163.99	156.48	499.73	258.83	1079.04

Unit Margin		Wisk	All	Tide	Cheer

100% pass through				
Retail unit margin w/ price cut	1.44	0.92	1.46	1.31
Manufacturer unit margin w/ price cut	1.88	0.83	1.65	1.70
70% pass through				
Retail unit margin w/ price cut	1.74	1.27	1.87	1.59
Manufacturer unit margin w/ price cut	1.58	0.48	1.24	1.43

Retailer Gross Profit	Wisk	All	Tide	Cheer	Category Total	% Change in Total Gross Profit
100% pass through						
pc1>0	**169.8**	94.5	301.7	156.3	722.2	**20.5%**
pc2>0	96.4	**196.1**	293.7	152.1	738.2	**23.1%**
pc3>0	84.5	80.6	**513.9**	133.3	812.3	**35.5%**
pc4>0	94.6	90.3	288.3	**247.0**	720.2	**20.1%**
70% pass through						
pc1>0	**205.3**	94.5	301.7	156.3	757.7	**26.4%**
pc2>0	96.4	**271.1**	293.7	152.1	813.2	**35.7%**
pc3>0	84.5	80.6	**660.4**	133.3	958.8	**59.9%**
pc4>0	94.6	90.3	288.3	**299.6**	772.8	**28.9%**

Manufacturer Gross Profit	Wisk	All	Tide	Cheer
100% pass through				
Profit	222.85	177.79	583.08	321.87
% change over benchmark	35.9%	13.6%	16.7%	24.4%
70% pass through				
Profit	187.38	102.73	436.75	269.26
% change over benchmark	14.3%	-34.3%	-12.6%	4.0%

Brand Offered with Price Cut	% Change in Retailer Gross Profit across Brands			
	Wisk	All	Tide	Cheer
Wisk	86%	9%	9%	9%
All	6%	126%	6%	6%
Tide	-7%	-7%	85%	-7%
Cheer	4%	4%	4%	72%