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# ANOTHER LOOK AT PRICE PROMOTION

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## Abstract

Weekly sales at retail stores exhibit several patterns that the existing literature on price promotion does not fully capture. In this paper we develop a simple symmetric model where duopoly manufacturers distribute competing brands through a monopoly retailer to serve consumers with heterogeneous reservation prices. We show that the heterogeneity in consumers' reservation prices coupled with the retailer's market power is sufficient to resolve the deficiency in the literature. We then show that, while pricing patterns under this model differ significantly from those under a model where the retailer has no market power, the manufacturers' expected profits are the same in both cases.

**Keywords:** Sales Promotion, Pricing, Game Theory

## Introduction

Price promotion at both the wholesale and retail levels is a ubiquitous phenomenon. As Raju et al. (1990) comment, short-term discounts are one of the major competitive weapons in the brand manager's arsenal. Blattberg et al. (1995) also note that nondurable goods manufacturers spend more money on promotion than on advertising. The most frequently seen price promotions are probably the weekly markdowns at grocery stores<sup>1</sup>. Table 1 below presents a series of such promotions<sup>2</sup>.

Table 1 illustrates several prominent and interesting patterns. First, competing brands of the same product are featured in different promotional periods<sup>3</sup>. That is, in a given week, at most one of the competing brands is featured. For example, Perdue chicken breast was advertised on sale during the week of March 25. Then, during the week of April 1, Tyson chicken breast replaced Perdue's in the flyer.

<sup>1</sup> Promotions at the wholesale level are called trade deals or trade promotions, and promotions at the retail level are called retail promotions. Among various forms of sales promotions, we concentrate solely on price cuts in this paper.

<sup>2</sup> The data is obtained from weekly sales flyers at the Kroger stores in Bloomington, IN. The promotional prices listed in the flyers were typically valid for one week.

<sup>3</sup> This phenomenon is also noted by Lal (1990), who attributes it to collusion between national brands.

Second, the promotional prices for the same product are similar both across competing brands and across different sales periods, even when the regular prices are different. For instance, Brawny and Scott paper towels had about a \$2 difference in their regular prices, but their sales prices were both \$4.99/pack. Third, the promotional prices represent relatively large discounts from the corresponding regular prices. In our sample above, we see price cuts of 30%-50% of the regular prices. Fourth, each of the brands was sold at the regular price more than half of the times.

These patterns naturally invite a search for theoretical explanations. In line with the importance of price promotion, there has been substantial research to rationalize price promotion. Varian (1980) shows that stores may use price promotion to exploit *information heterogeneity* among consumers. Baye and Morgan (2001) further the analysis by studying the *impact of a market for price information* on retail pricing strategies on the homogeneous product market it serves. Along a similar line, Narasimhan (1988) analyzes differences in consumers' *brand loyalty* and shows that firms employ mixed pricing strategy to attract brand switchers. Agrawal (1996), Lal and Villas-Boas (1998), Raju et al. (1990), Rao (1991) and Simester (1997) strengthen this argument of brand loyalty and extend it to more general settings. Conlisk et al. (1984), Sobel (1984), and Pesendorfer (2002), on another hand, examine price promotion in intertemporal settings and relate it to *intertemporal price discrimination* and *intertemporal demand effects*.

While these existing studies cast tremendous insights on understanding firms' price promotion decisions, they cannot satisfactorily account for the patterns revealed in Table 1. In particular, models with common reservation price, such as Varian (1980), Lal and Villas-Boas (1996, 1998), and Baye and Morgan (2001), predict that everything is on sale everyday, yet the depth of sale can be any amount of a random draw from the equilibrium price distribution. Such predictions contradict some of the main characteristics of weekly sales at Kroger; namely, the alternating featuring of different brands in different weeks, use of the same sales price for competing brands, and deep discounts from the regular prices. In addition, in the Kroger flyers we observe that both of the competing brands have positive probabilities to be priced at their regular and promotional prices, whereas models with asymmetry

in brand loyalty, such as Narasimhan (1988) and Raju et al.(1990), prescribe that only the stronger brand has a positive probability of being sold at the regular price. Moreover, many studies in the literature, including Varian (1980), Sobel (1984), Narasimhan (1988), Lal (1990), Raju et al. (1990), and Baye and De Vries (1992), abstract away from

the channel setting. But as shown by Lal and Villas-Boas (1996, 1998) and Baye and Morgan (2001), strategic interaction between channel members plays an important role in their pricing decisions.

**Table 1.** Price Promotions Observed in Kroger Weekly Flyers

Product	Boneless Skinless Chicken Breast		Orange Juice (64oz Carton)		8 Roll Paper Towel	
	Perdue	Tyson	Minute Maid	Tropicana	Brawny	Scott
<b>Regular Price</b>	\$4.99/lb	\$4.99/lb	\$3.75/carton	\$3.89/carton	\$9.45/pack	\$7.29/pack
03/25/2004	\$1.99/lb	Not featured	Not featured	Not featured	Not featured	\$4.99/pack
04/01/2004	Not featured	\$1.99/lb	\$1.99/carton	Not featured	\$4.99/pack	Not featured
04/08/2004	Not featured	\$1.99/lb	Not featured	\$1.99/carton	\$4.99/pack	Not featured
04/15/2004	Not featured	Not featured	Not featured	Not featured	Not featured	\$4.99/pack
04/22/2004	\$1.99/lb	Not featured	\$1.99/carton	Not featured	Not featured	Not featured
04/29/2004	Not featured	Not featured	Not featured	Not featured	Not featured	Not featured

In this paper, we employ a parsimonious model to reconcile the above inconsistency between the observed sales patterns and theory, and to also analyze how market structure affects promotional decisions. In our symmetric model<sup>4</sup>, duopoly manufacturers distribute close substitutes through a common monopoly retailer to serve consumers with heterogeneous reservation prices. We show that the heterogeneity in consumers' reservation prices (reservation price differential hereinafter) coupled with the retailer's market power is sufficient to drive all the promotional patterns revealed in Table 1. We show that the retailer employs pure-strategy Hi-Lo pricing to exploit the reservation price differential, and it only does so when the size of the low valuation segment is large enough. The competing manufacturers, on the other hand, use mixed strategies in wholesale price cuts to compete for the chances of serving low valuation consumers.

We also highlight the effects of channel structure on sales patterns and welfare. A powerful retailer in the channel is able to set stickier retail prices that are not linear functions of the wholesale prices. Thus the Hi-Lo retail pricing will not break down even when the wholesale prices are only one penny apart<sup>5</sup>. On

<sup>4</sup> The symmetry in our model enables us to obtain more general results that do not rely on any asymmetry in the competing manufacturers' market shares, consumers' brand loyalty level, or relative sizes of different consumer segments between competing brands.

<sup>5</sup> This finding differs from the results in Agrawal's (1996) study, where the Hi-Lo price equilibrium can break down when the two manufacturers price closely enough to each other.

the other hand, if the retailer has no power in the channel, pricing patterns at both the retail and wholesale levels change significantly. There are more price promotions and deeper discounts to benefit the consumers, but the manufacturers' expected profits remain the same.

Our model integrates the extant models of price promotion with added features, which allows us to obtain better data fitting equilibrium pricing patterns than those predicted by the existing studies. For example, our base model can be thought as Narasimhan's (1988) model with an added monopoly retailer and with reservation price differential between loyal consumers and brand switchers. Our direct selling model can be thought as a general version of Varian's (1980) and the no-loyalty case of Lal and Villas-Boas's (1998) models that allow reservation price differential<sup>6</sup>. While none of these three models predicts a fixed promotional and/or regular price as seen in the Kroger flyers, our model does.

The rest of the paper is arranged as follows. In Section 2, we first analyze the base model with a powerful retailer, then deprive the retailer of channel power and solve for the resulted equilibrium, and in the end compare the price promotion patterns from these two models. Section 3 concludes.

## Concluding Remarks

<sup>6</sup> There are some other extreme cases in Lal and Villas-Boas's (1998) study, as pointed out by one reviewer. Most of those cases deal with size asymmetry in consumer segments for different manufacturers and retailers.

In this paper we examine the incentives for price promotion from a different perspective: the segmentation of consumer market based on reservation price. The results derived from our model do not depend on brand loyalty and can be applied to both the cases of repeatedly purchased products and those of durable goods. The predictions of our model are consistent with the price promotion patterns observed at retail stores. We have also shown that (1) heterogeneity in consumers' reservation prices is an important determinant of competitive price promotion strategies, (2) differences in market structure can result in significant differences in the pricing patterns at both the retail and wholesale levels, but (3) because of competition in the retail market, changes in market structure do not necessarily alter wholesale profitability.

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