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National Brand and Store Brand Competition: Who Hurts Whom?

Raj Sethuraman

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Report Summary

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Private-label grocery products — store brands that are generally owned, controlled, and sold exclusively by retailers — now generate more than $48 billion in sales each year. The most compelling reason for this increased presence in the market is their price differential with national brands: it is believed that private labels gain sales by offering lower prices than high-quality national brands. To counter the growing popularity of store brands, national brand manufacturers have begun to wage the battle for market share by conducting aggressive price promotions.

Understanding how discounting affects sales has thus become central to managers' ability to make appropriate price/promotion decisions. Accordingly, this paper investigates two critical questions:

- Do national brand price reductions hurt (significantly decrease) private-label sales, and do private-label price reductions hurt (significantly decrease) national brand sales?
- If so, what types of national brands hurt private-labels through price cutting? What types of national brands are hurt by private-label price cuts?

Data and Method

The data used in this analysis are weekly store-level sales for 104 weeks during 1991-93. Six product categories (bathroom tissue, fabric softener sheets, all-purpose flour, margarine, orange juice, and canned tuna) from three supermarket chains were selected, including 55 national brands and 16 private brands.

This paper investigates whether short-term price discounts by national brands reduce aggregate private-label sales, and vice versa, through a meta-analysis of 261 cross-price elasticity estimates obtained from 16 product-chain combinations. After computing the overall impact of price cuts, it then assesses whether there are systematic variations in cross-price effects due to two key national brand characteristics: market share and relative price.

"Price cuts by national brands do hurt private-label sales. About 50% of the national brands draw sales away from store brands with their price promotions."

Key Findings

The results lend broad support to the findings of previous research, and have important implications for both national brand and store brand marketing managers. Specifically, my analysis reveals that:

- Price cuts by national brands do hurt private-label sales. About 50% of the national brands draw sales away from store brands with their price promotions. Price-cutting by nearly the same share of national brands, however, does not dampen private-label sales. These brands may therefore have to adopt other strategies, such as advertising and product improvements, to attract private-label customers.

❑ The effect of private-label price cuts on national brand sales is less pronounced. Private-label promotions reduce sales of national brands in only 25% of the cases. This suggests that price-cutting is not an effective way for private-label brands to compete for customers of several national brands.

❑ National brands with large market share, especially market leaders, can hurt private-label sales with their price cuts, and they are generally unaffected by private-label discounts. As a result, large national brands can use price promotions as a strategy to reduce private-label sales in the short term.

❑ National brands that are similar in price to the store brand can hurt private-label sales by price-cutting, and they in turn are more likely to be affected by private-label discounting. As a result, both national brand and store brand managers can use discounting to attract the other brand's customers.

Since this analysis relates to short-term sales changes in response to short-term price changes, it is important to interpret the results accordingly. In particular, the lack of private-label price effects on sales of several national brands does not imply that these national brands do not have to worry about private labels; it simply suggests that store brand price-cutting does not affect national brand sales in the short term. At the same time, while these national brand managers need not be concerned about private-label discounting, they cannot overlook the presence of private labels and their ability to penetrate the market.

Raj Sethuraman is Assistant Professor in the Department of Marketing at the University of Iowa.

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Introduction

In an era of flat grocery revenues, sales of store brands have been growing at twice the pace of national brands (Deveny 1992) and now account for about $48 billion in revenue. In fact, private-label brands now have more than a 50% market share in milk, frozen vegetables, and some first-aid products — and are gaining ground in such traditional national brand bastions as cereals, cigarettes, and diapers (Strauss 1993; Gibson 1994).

One important competitive advantage of private labels is their price differential with national brands. It is commonly believed that private labels gain sales by offering the product at a lower price than national brands. As a result, both national brand manufacturers and the retailers who own, control, and exclusively sell a store brand are currently locked in a market-share battle that is often conducted through short-term price promotions.

Understanding how these promotions affect sales is critical to the ability of marketing managers to make appropriate pricing decisions. On the one hand, national brand manufacturers are cutting prices to gain market share from private labels and to protect themselves from private-label encroachment. For instance, in response to threats from private labels, Philip Morris has cut the price of Marlboro cigarettes, and Proctor and Gamble has lowered the prices of Pampers diapers and Tide detergent (Ortega and Stern 1993).

On the other hand, all recent cross-category studies (McMaster 1987; Sethuraman 1992; Hoch and Banerji 1992) have found a negative relationship between price differential and private-label market share across categories — that is, the larger the price differential between the national and store brands in a category, the smaller the private-label market share. This finding has been picked up by the popular press (e.g., Gibson 1992; Holton 1992) and interpreted to mean that price differential is not an important determinant of private-label share — in fact, it seems to work in the opposite direction. Based on this result and other considerations, some researchers (Hoch and Banerji 1993; Sethuraman 1992) have advocated that national brand manufacturers focus less on price-cutting and more on other aspects such as product quality and advertising.

Nevertheless, Raju, Sethuraman, and Dhar (1994) have analytically demonstrated that cross-category studies may not reflect the "true" effect of price on private-label sales. Instead, they assert that the appropriate method for assessing price effects is to analyze within-category data. Blattberg and Wisniewski (1989) also show that, based on four products from one chain, price promotions by higher-quality, higher-priced (national) brands draw unit sales both from their own price-tier competitors and from the tier below (private brands). Moreover, price promotions by the lower-quality, lower-priced tier (private) brands rarely take sales from the (national brand) tier above.

Thus, as national brand manufacturers and retailers engage in a price battle, the following questions arise:

- ❑ Overall, do national brand price reductions have little effect on private-label sales, as suggested?
- ❑ Or do national brand price reductions significantly decrease private-label sales, while private-label price cuts have little effect on national brand sales?
- ❑ Specifically, what types of national brands hurt private-label sales through their price cuts?
- ❑ And what types of national brands are hurt by private-label price cuts?

The answers to these questions are important for both national and store brand managers. For national brand manufacturers, determining whether their price promotions take sales away from private labels can help in deciding whether to use price-cutting to stem private-label growth. Knowing whether private-label price reductions hurt their own sales will also help them to decide whether to use price promotions as a defensive strategy.

And for private-label marketers, knowledge that their brand can take sales away from national brands can help them decide whether to use price cuts as an aggressive strategy to garner more sales. Knowledge of whether national brand price reductions hurt their private brand sales will also help them to determine if cutting their own prices is a good defensive strategy.

This paper addresses these issues by studying how short-term (weekly) price changes by national brands affect sales of private labels, and vice versa, across several brands, products, and stores. Since short-term price changes reflect temporary discounts, the cross-price effects should primarily reflect the impact of promotions on sales (Blattberg and Wisniewski 1989; Bolton 1989).

In the following section, I specify the hypotheses that relate two key brand characteristics — market share and relative price — to cross-price effects. I then describe the data used for estimating the cross-price elasticities and the method of estimation. The subsequent sections summarize the meta-analysis of these cross-price elasticities, discuss the key empirical results, and describe the implications for marketing managers.

Hypotheses

This paper focuses on two national brand characteristics of critical importance to managers: market share and relative price. This section discusses these characteristics and develops the hypotheses to be tested.

National Brand Market Share

Given a certain price cut, a national brand should reduce private-label sales if a private-label consumer inspects that particular national brand. A consumer would inspect an alternative brand that s/he is aware of or that is in his/her consideration set. National brands with large market share are generally the more popular brands and they also spend heavily on advertising. Awareness level — and hence the number of consumers who are likely to include the brand in their consideration set — is therefore likely to be greater for these brands (Hauser and Wernerfelt 1989). Because of their popularity, these leading brands also have greater drawing power. As a result, more private-label consumers are likely to switch to these national brands when they offer discounts. Hence,

> $H(NB \rightarrow PL)_1$: Other things equal, price discounts by national brands with larger market share cause a greater reduction in private-label sales than price discounts by national brands with smaller market share.[1]

At the same time, discounting by private-label brands is less likely to reduce sales of national brands with large market share. Brands with large market share possess strong market power because of their popularity and high advertising levels (Porter 1976; Bolton 1989), and are therefore insulated from incursions from private-label discounting. Brands with small market share, in contrast, have little market power and are more vulnerable to store-brand manipulations (Stern 1966). Hence,

> $H(PL \rightarrow NB)_1$: Other things equal, price discounts by private-label brands reduce sales of national brands with smaller market share more than sales of national brands with larger market share.

Empirical tests of these hypotheses are useful for two reasons. First, reports in the business press suggest that competition with private labels is of particular concern to large national brands. Second, analyzing the cross-price effects for these brands provides a test of the market share = market power theory, in the context of national brand/store brand competition.

National Brand Relative Price

Blattberg and Wisniewski (1989) suggest that brands in a product category are organized in discrete price tiers — lower-priced/lower-quality brands and higher-priced/higher-quality brands. They theorize that when the higher-priced, higher-quality brands cut prices, consumers of the lower-priced, lower-quality brands find value and switch to the promoted higher-quality brand. Allenby and Rossi (1991) show that the asymmetric switching is consistent with a model of non-homothetic preferences.

Extending this argument to continuous price/quality states implies that the higher the brand price (quality), the greater the value perceived by the private-label consumer, and the more likely s/he will be to switch brands. This argument leads to the following hypothesis:

$H(NB \rightarrow PL)_2$: Other things equal, price discounts by national brands with higher relative prices reduce private-label sales more than price discounts by national brands with lower relative prices.

One can argue that the brands that are closer in price to private labels are more likely to be in the consideration set of private-label consumers. According to this line of thinking, price-cutting by national brands with lower relative prices is therefore more likely to reduce private-label sales. This counter-argument makes the empirical test especially interesting.

Blattberg and Wisniewski (1989) also theorize that when the lower-priced, lower-quality brands cut prices, they rarely take sales away from the higher-priced, higher-quality brands. Again extending this theory to continuous price/quality states, consumers of higher-priced national brands would be less likely to switch to the store brand even when the store brand is promoted because they would perceive a large quality difference. Hence,

$H(PL \rightarrow NB)_2$: Other things equal, price discounts by private-label brands reduce sales of national brands with lower relative prices more than sales of national brands with higher relative prices.

Data and Estimation of Cross-Price Elasticities

DATA

Using store-level supermarket scanner data from Information Resources, Inc. (IRI), this empirical analysis covers six product categories. Because the focus is on price effects and not on attribute/size effects as in Blattberg and Wisniewski (1989), the categories are defined so that brands are comparable on basic attributes and package size. The package sizes selected are the ones with the highest unit sales. The categories are:

- 4-roll white bathroom tissue,
- 40-count fabric softener sheets,
- 5-lb. all-purpose flour,
- 16-oz. margarine,
- 64-95.9 oz. orange juice (from concentrate),
- 1/2 size canned tuna (water pack).

Data for these product categories are from three stores in different locations and belonging to different chains.[2] Because one of the chains does not have information on flour and orange juice, there are 16 data sets or product-chains comprising 73 brands (56 national brands, 16 private-label brands, and one generic brand). Each data set contains weekly information on unit sales by item, price by item, whether the item was discounted, and the deal percentage, as well as display and feature information. Data are available for 104 weeks during 1991-93.[3]

ESTIMATION PROCEDURE

Of the 73 brands, one national brand was unavailable during part of the analysis period, and the one generic brand had little price variation and poor model fit. The remaining 71 brands (55 national brands and 16 private labels) were therefore used in the analysis.

I estimated each of the 71 brand sales equations separately and obtained measures of own- and cross-price elasticities. Because the objective is to describe rather than forecast the market, I used all 104 observations in the analysis (no holdout sample). The econometric model relates the weekly sales of each brand to own price, competitors' price, and other variables (covariates) that might affect brand sales. The covariates are display and feature indicators for the estimation brand as well as for competitors' brands. The display (feature) indicator for a brand takes a value of 1 if the brand is displayed (featured) during that week, and 0 otherwise.

I also include a seasonality indicator for flour and margarine that takes a value of 1 during November and December to coincide with Thanksgiving and Christmas weeks (Blattberg and Wisniewski 1989), and 0 otherwise. Consumption of these products is likely to be higher during the holiday season, and the category sales in the data are also higher at that time.

I estimated three commonly used functional forms (Blattberg and Wisniewski 1989; Bolton 1989) for each brand:

- ❑ Linear model, where the dependent variable is unit sales and the independent price variables are unit prices.
- ❑ Semi-log model, where the dependent variable is the logarithm of unit sales and the independent price variables are unit prices.
- ❑ Double-log or multiplicative model, where the dependent variable is the logarithm of unit sales and the independent price variables are the logarithm of prices.

I first estimated each functional form for each brand using OLS. Heteroscedasticity is detected using the BPG test and corrected using the weighted least squares approach (Kmenta 1986, pp. 269-83). In general, heteroscedasticity is not a problem in the data sets.

I also tested for first-order serial correlation using the Durbin-Watson test. Serial correlation is detected in several brand sales models, suggesting that the model may be misspecified due to missing variables that may be correlated over time (e.g., media advertising, carryover effect). In these cases, I estimated two alternative models by (a) including a lagged sales term to account for carryover effect, and (b) including an autocorrelated error term. The estimates are similar in both models in a large number of cases. If the lagged sales term is statistically significant and reduces the magnitude of the serial correlation to near zero, I chose the model with the lagged sales term. Otherwise, I chose the model with the autocorrelated error term.

I investigated the extent and location of multicollinearity by inspecting the correlations among the regressors and by analyzing the condition indices, variance inflation factors, and singular value decomposition (Belsley, Kuh, and Welsh 1980). (See Appendix for details.) Collinearity does not appear to be a major concern. In the four cases where there is some problem, it reflects a high correlation between display and feature indicators (in which case I combine them into a single variable), or between price and own display/feature (in which case I exclude the display or feature indicator).

From the price coefficients, I then computed the cross-price elasticities. In the linear model, I calculated elasticity by multiplying the coefficient with (mean actual price/mean sales). In the semi-log model, it is computed by multiplying the coefficient with mean price. In the double-log model, the price coefficient is itself an estimate of the price elasticity.

Meta-Analysis of Cross-Price Elasticities

Overall, there are 55 (NB→PL) brand pairs with which to measure the effect of a price cut by the national brand on private-label sales, and 55 (PL→NB) brand pairs with which to measure the effect of a price cut by the private-label brand on national brand sales. For each brand pair, I estimated the cross-price elasticity using three functional forms.

Since there is no a priori reason for choosing any particular functional form, I used the following procedure for selecting the elasticities for the analysis. An estimate is good if it comes from a model that fits well. I used the correlation between actual sales and predicted sales as a measure of model fit. (See the Appendix for the correlations for the 213 brand sales equations.) Of these, 12 are excluded because the model fit is inferior to alternative functional forms (i.e., the correlation between actual and predicted sales is below the correlation from another model by more than .05). In the other cases, all functional forms provide more or less the same fit and their estimates are retained. The correlations between actual and predicted sales for these 201 models range from .5 to .99, with an average of .82.

A second important criterion for a good estimate is that it should have the right sign. Conventional economic theory suggests that a brand's price cut would decrease a competing brand's sales — i.e., the cross-price elasticity would be non-negative. Hence, I retain all elasticities that are non-negative. For 52 of the 55 (NB→PL) pairs used to estimate the effect of the national brand price cut on private-label sales, there is at least one cross-price elasticity estimate that has the right (non-negative) sign. For the remaining three brand pairs, I inspected the elasticity with the least negative number. In those cases, the magnitude of the estimate is small (less than .5) and statistically not significant ($t < 1$). I therefore set the elasticity estimate to zero.

This approach is somewhat consistent with Allenby's (1989) study, which argues for constrained estimation to obtain right signs. A similar approach has also been used in earlier meta-analysis studies (Sethuraman and Tellis 1991). Thus, for analyzing the effect of a national brand price cut on private-label sales, there are 137 cross-price elasticity estimates from 55 brand-pairs, all with the right sign.

For 48 of the 55 (PL→NB) brand pairs used to estimate the effect of private-label price cuts on national brand sales, there is at least one cross-price elasticity estimate that has the right (non-negative) sign. For seven of the other brand pairs, I inspected the elasticity with the least negative number. In six cases, the magnitude of the estimate is small (less than .7) and statistically not significant ($t < 1.2$). I therefore set the elasticity estimate to zero. In the last case, the elasticities were negative and statistically significant, and I therefore deleted the brand pair. For analyzing the effect of private-label price cuts on national brand sales, there are 124 observations from 54 brand pairs, all with the right sign. To maximize the amount of available information, following Farley and Lehmann (1986), I used all of the estimates in the analysis and considered each estimate an observation.

Treating multiple elasticity estimates for the same brand pair as separate observations could lead to duplication and lack of independence. To avoid duplication, I weighted the observations by the number of replications — that is, where there are valid cross-elasticity estimates for a brand pair from two functional forms, I weighted each of those estimates by 0.5; where there are three valid elasticity estimates for a brand pair, I used a weight of .33; if there is only one valid estimate, I used a weight of 1.

As for lack of independence arising from analysis of multiple observations from a study, Farley and Lehmann (1986, p. 106) and Hunter and Schmidt (1990, p. 452) point out that the problem may not be very serious if the number of replications is small relative to the total number of observations. In this case, the 261 elasticities come from 109 brand pairs (an average of 2.3 estimates per brand pair).

Overall Analysis

To answer the question of whether national brand price reductions hurt private-label sales, I analyzed the cross-price elasticities from the private-label sales model, $\eta(NB \rightarrow PL)$. They measure the percent change in private-label sales in response to a one-percentage point decrease in national brand price. There are 137 cross-price elasticities from 16 product-chain combinations. The cross-price elasticities range from 0 to 1.9. The weighted average cross-price elasticity of 0.56 (std. dev. = .27) indicates that, for these 16 product-chains and 55 brands, a one percentage point price cut by national brands results in an average .56% decline in private-label sales. The mean elasticity estimate is significantly greater than zero ($t_{54} = 2.07$, $p < .05$).

Twenty-nine (53%) of the 55 national brands have significant cross-price elasticities in at least one functional form, as evidenced by a t-value greater than 1.67 (critical t for one-tailed test at the 95% confidence level). These findings indicate that price-cutting by about half the national brands does in fact reduce private-label sales, and that the effect cumulated across all brands is significantly greater than zero.

To determine whether private-label price reductions hurt national brand sales, I analyzed the cross-price elasticities from the national brand sales model, $\eta(PL \rightarrow NB)$. They measure the percent change in national brand sales for a one percentage point decrease in private-label price. There are 124 cross-price elasticities from 16 product-chain combinations. The cross-price elasticities range from 0 to 2.12. The weighted average cross-price elasticity is 0.51 (std. dev. = .33) and is significantly greater than zero only at the 10% level ($t_{53} = 1.55$, $p < .10$). Note that the mean cross-price elasticity of private-label price cuts on national brand sales (.51) is only slightly lower than the mean cross-price elasticity of national brand price cuts on private-label sales. There is, however, a greater variation in the cross-price effect of private-label price cuts on national brand sales, as indicated by the larger standard deviation (.33 vs. .27).

Thirteen (24%) of the 54 brand pairs have significant cross-price elasticities ($t > 1.67$) in at least one of the models. These findings indicate that price reductions by private brands do not affect a large number of national brands, and that the impact cumulated across all brands is only marginally significant.

Test of Hypotheses

National brand market share (NBSHARE) is computed for each national brand in each product and store by dividing total unit sales of the brand across 104 weeks by total sales of all brands in the category. Relative price (NBRELPRICE) for each national brand is computed by dividing the mean regular price of the national brand by the mean regular price of the private-label brand.

To test if the cross-price elasticity (η) varies systematically with market share and relative price (after accounting for variations due to other factors such as product and chain differences), I estimated a multiple regression model that includes these two brand characteristics as independent variables, as well as indicators or dummy variables representing product, chain, and functional form differences. The following model was used to determine what type of national brands hurt private-label sales through their price promotions:

$$(1)\quad \eta(NB \rightarrow PL) = a_0 + a_1\,(NBSHARE) + a_2\,(NBRELPRICE) + \sum_j a_{3j}\,(PRODUCTDUMMY)_j + \sum_k a_{4k}\,(CHAINDUMMY)_k + \sum_l a_{5l}\,(FUNCFORMDUMMY)_l + \text{error}.$$

There are five product dummies representing six products, two chain dummies for the three chains, and two functional form dummies for the three functional forms.

The model is estimated using OLS.[4] The results of the regression are reported in Table 1 (page 14). The coefficient of national brand share is positive and significant as hypothesized, but the coefficient of national brand relative price is negative and significant.

I then estimated a similar model to determine what type of national brands are hurt by private-label price cuts. In this model, the independent variables are the same as in model (1), but the dependent variable is $\eta(PL \rightarrow NB)$ rather than $\eta(NB \rightarrow PL)$.

$$(2)\quad \eta(PL \rightarrow NB) = b_0 + b_1\,(NBSHARE) + b_2\,(NBRELPRICE) + \sum_j b_{3j}\,(PRODUCTDUMMY)_j + \sum_k b_{4k}\,(CHAINDUMMY)_k + \sum_l b_{5l}\,(FUNCFORMDUMMY)_l + \text{error}.$$

The model is estimated using OLS, with the results also reported in Table 1. As hypothesized, the coefficient of national brand share and the coefficient of relative price are both negative and significant.

These findings indicate that price promotions by national brands with large market shares have a significant impact on private-label sales, while price cuts by private-label brands have much less of an effect on these leading brand sales. Price promotions by national brands with lower relative prices are more likely to reduce private-label sales, just as sales of these brands are more likely to be reduced by private-label price cuts.

Other Results

Another result that deserves mention relates to market share. The issue of cutting prices to counter private-label encroachment seems to be a particularly important concern for leading national brands (with the largest market share) in grocery products, e.g., Marlboro cigarettes, Pampers diapers, Tide detergent (Gibson 1994; Ortega and Stern 1993). Among the 16 leading national brands with the largest shares in each product-chain, 12 (75%) affect private-label sales through their price promotions ($t > 1.67$). The average cross-price elasticity is .66 (std. dev. = .32).

At the same time, sales of only 2 (12%) of the 16 leading brands are affected by private-label price cuts. The average cross-price elasticity is .32 (std. dev. = .22). These findings again suggest that leading national brands can hurt private labels with their price cuts, but they are themselves little affected by private-label price cuts.

Inspection of the regression coefficients for product dummies in Table 1 provides additional insights into product variations. Compared with flour, which is generally considered a commodity product with little perceived quality differential, bathroom tissue and fabric softener have significantly lower cross-price elasticities (negative signs) in both models. These products are also generally considered more differentiated than others in this set.[5] This provides some evidence that the impact of price discounts is smaller for more differentiated than for less differentiated commodity products.

Chain-level differences also exist, especially in the analysis of the effects of private-label price cuts on national brand sales. However, there are no systematic variations due to the functional form used for estimating the cross-price elasticities.

Table 1. Regression Results

	Model 1 NB→PL		Model 2 PL→NB	
Variable	**Est.**	**t-stat**	**Est.**	**t-stat**
Intercept	1.27	2.79^a	2.89	5.66^b
NB Share	.006	1.92^a	-.023	-6.46^a
NB Relative Price	-.47	-1.78^b	-1.03	-3.41^a
Bathroom Tissue	-.39	-2.58^a	-.31	-1.81^b
Fabric Softener	-.28	-1.78^b	-.23	-1.28
Margarine	-.12	-.92	-.33	-1.20
Orange Juice	.11	.64	-.09	-.47
Tuna	.05	.33	-.07	-.42
Flour (base)	–	–	–	–
Chain A	-.02	-.18	-.48	-4.75^a
Chain B	-.01	-.06	-.37	-3.6^a
Chain C (base)	–	–	–	–
Linear Model	-.10	-1.2	-.05	-.56
Semi-log Model	-.06	-.79	-.05	-.49
Double log (base)	–	–	–	–
R^2 (adj R^2)	.24(.18)	F=3.66^a	.39(.33)	F=6.56^a

$^a p < .05$ $^b p < .10$
NB = National Brand
NB → PL = Cross-price effect of national brand price cut on private-label sales.
PL → NB = Cross-price effect of private-label price cut on national brand sales.

Implications for National Brand and Store Brand Marketing

Overall, national brand price cuts do affect private-label sales. The average cross-price elasticity of .56 means that, on average, a 1% price cut by the national brands reduces sales of private-label brands by .56%. Price promotions for about half of the national brands significantly decrease private-label sales. On the other side of the coin, though, price cuts by the other half of the national brands do not influence private-label sales markedly. These national brands may have to resort to other mechanisms such as advertising and product/quality improvements to draw private-label customers, as suggested by Hoch and Banerji (1993).

The evidence for the effect of private-label discounting on national brand sales is mixed. The average cross-price elasticity is .51, close to the average cross-price effect of national brand price cuts on private-label sales. In this case, however, the impact varies: discounts by store brands significantly reduce sales of some national brands, but not others.

In particular, while 50% of the national brands hurt private-label sales through their discounts, only 24% of the national brands are hurt by private-label discounts. This finding supports the asymmetric price-tier theory of Blattberg and Wisniewski (1989) in that a relatively larger number of national brands can hurt private-label sales through price-cutting, while fewer private labels can hurt national brand sales in this way. They theorize that this occurs because of differences in consumers' willingness to pay for quality. Regular consumers of national brands perceive the brand to be of higher quality and are willing to pay a higher price. Hence, they are unwilling to "trade down" to a private label even when it is promoted. On the other hand, regular consumers of private labels are price-sensitive and are willing to "trade up" to a national brand when it is promoted.

To retailers, this finding suggests that discounting their private labels may not attract consumers away from several national brands. In fact, cutting private-label prices probably rewards consumers who would have bought the brand anyway. Manufacturers of national brands, in contrast, can use price promotions to much greater effect. In particular, national brands with large market shares are likely to take more sales away from private labels by discounting. What this implies is that national brands with large market shares, especially leading brands, can reduce private-label sales by price-

Notes

1. Hereafer NB→PL denotes the effect of national brand price reductions on private-label sales, and PL→NB denotes the effect of private-label price reductions on national brand sales.
2. Confidentiality agreements prevent disclosure of the names of these chains or their private-label brands.
3. In 3 of the 16 data sets, information is available for only 60-80 weeks.
4. Diagnostic tests do not indicate problems of heteroscedasticity ($\chi^2_{55} = 56.1$, $p > .4$) or multicollinearity (variance inflation factors less than 5; condition indices less than 10).
5. In a survey conducted by the author in 1993, consumers perceived the largest differences in quality between national and store brands for these products (among the six categories analyzed here).

TABLE A2. MODEL FIT
(Correlation between actual & predicted sales)

Product	Chain	Brand	Model: Linear	Semi-log	Double-log
Bathroom Tissue	A	Charmin	.80	.78	.76
		Hope	.83	.80	.80
		Nice & Soft	.78	.75	.76
		Northern	.84	.82	.83
		Private Label	.89	.90	.91
		Soft & Gentle	.88	.89	.87
	B	Charmin	.94	.91	.91
		Cottonelle	.94	.91	.89
		Kleenex	.88	.87	.85
		Northern	.92	.77*	.73*
		Private Label	.85	.81	.81
	C	Charmin	.88	.85	.90
		Nice & Soft	.89	.94	.94
		Northern	.87*	.95	.95
		Private Label	.90	.95	.95
Fabric Softener	A	Bounce	.85	.85	.85
		Downy	.84	.83	.82
		Private Label	.81	.78	.78
		Snuggle	.83	.83	.83
		Toss & Soft	.77	.77	.77
	B	Arm & Hammer	.55	.56	.55
		Bounce	.73	.72	.72
		Downy	.62	.61	.61
		Private Label	.92	.92	.92
		Snuggle	.50	.50	.50
	C	Arm & Hammer	.78	.78	.78
		Bounce	.93	.93	.94
		Downy	.69	.71	.70
		Private Label	.77	.77	.77
		Snuggle	.86	.85	.85
Flour	B	Ceresota	.89	.87	.87
		Gold Medal	.91	.88	.86
		Pillsbury	.81	.82	.82
		Private Label	.85	.81	.81
	C	Gold Medal	.76*	.85	.88
		Hungarian	.99	.99	.99
		Pillsbury	.79*	.85	.88
		Private Label	.68	.69	.69

*Excluded from the analysis.

TABLE A2. MODEL FIT

Product	Chain	Brand	Model: Linear	Semi-log	Double-log
Margarine	A	Blue Bonnet	.87	.88	.85
		Imperial	.76	.77	.77
		Land O'Lakes	.52	.52	.52
		Parkay	.77	.77	.73
		Private Label	.72	.73	.72
	B	Blue Bonnet	.86	.84	.84
		Imperial	.89	.92	.89
		Land O'Lakes	.88	.89	.90
		Parkay	.87	.87	.83
		Private Label	.90	.89	.87
	C	Blue Bonnet	.69	.70	.70
		Imperial	.80	.80	.80
		Parkay	.59	.59	.63
		Private Label	.71	.67	.68
Orange Juice	A	Citrus Hill	.70	.72	.73
		Minute Maid	.89	.85	.84
		Private Label	.78	.74	.74
	B	Citrus Hill	.92	.92	.92
		Minute Maid	.87	.84	.83
		Private Label	.86	.84	.86
		Tropicana	.87	.91	.86
Tuna	A	Bumble Bee	.90	.92	.94
		Chicken of Sea	.80	.84	.84
		Private Label	.91	.86	.86
		Starkist	.93	.98	.98
	B	Bumble Bee	.80	.75	.74*
		Chicken of Sea	.87	.82	.74*
		Private Label	.79	.81	.80
		Starkist	.88	.87	.79*
	C	Bumble Bee	.68	.60*	.57*
		Chicken of Sea	.84	.66*	.71*
		Private Label	.98	.99	.99
		Starkist	.62*	.84	.87

*Excluded from the analysis.

References

Allenby, Greg M. (1989), "A Unified Approach to Identifying, Estimating and Testing Demand Market Structures with Aggregate Scanner Data," *Marketing Science* 8 (Summer), 265-80.

_____ and Peter E. Rossi (1991), "Quality Perceptions and Asymmetric Switching Between Brands," *Marketing Science* 10 (Summer), 185-204.

Assmus, Gert, John U. Farley, and Donald R. Lehmann (1984), "How Advertising Affects Sales: Meta-Analysis of Econometric Results," *Journal of Marketing Research* 21 (February), 65-74.

Belsley, D. A., E. Kuh, and R. E. Welsh (1980), *Regression Diagnostics.* New York: John Wiley and Sons.

Blattberg, Robert C. and Kenneth J. Wisniewski (1989), "Price Induced Patterns of Competition," *Marketing Science* 8 (Fall), 291-309.

Bolton, Ruth N. (1989), "Relationship Between Market Characteristics and Promotional Price Elasticities," *Marketing Science* 8 (Spring), 153-69.

Deveny, Kathleen (1992), "More Shoppers By-pass Big Name Brands and Steer Carts to Private Label Products," *The Wall Street Journal,* October 20, p. B1.

Farley, John U. and Donald R. Lehmann (1986), *Meta-Analysis in Marketing.* Lexington, MA: D. C. Heath & Co.

Gibson, Richard (1994), "Classic Cheerios and Wheaties Reformulated," *The Wall Street Journal,* August 31, p. B1.

_____ (1992), "Store Brand Pricing Has to be Just Right," *The Wall Street Journal,* February 1, p. B1.

Hauser, John R. and Birger Wernerfelt (1989), "The Competitive Implications of Relevant-Set/Response Analysis," *Journal of Marketing Research* 26 (November), 391-405.

Hoch, Stephen and Shumeet Banerji (1992), "When Do Private Labels Succeed?" Chicago, IL: University of Chicago, Working Paper.

_____ and _____ (1993), "When Do Private Labels Succeed?", *Sloan Management Review* (Summer), 57-67.

Holton, Lisa (1992), "You'll Love Private Labels," *Chicago Sun-Times,* March 1, p. 45.

Hunter, John E. and Frank L. Schmidt (1990), *Methods of Meta-Analysis: Correcting Error and Bias in Research Findings.* Newbury Park, CA: Sage Publications.

Kmenta, Jan (1986), *Elements of Econometrics.* 2nd Edition. New York: Macmillan.

Lemon, Katherine N. and Russell S. Winer (1993), "Evaluating Consumers' Response to Private Label Promotions Utilizing Brand-Loyalty Based Segmentation." Unpublished manuscript.

Leone, Robert P. and Randall L. Schultz (1980), "A Study of Marketing Generalizations," *Journal of Marketing* 44 (Winter), 10-18.

McMaster, Derek (1987), "Own Brands and the Cookware Market," *European Journal of Marketing* 1 (21), 83-94.

Ortega, Bob and Gabriela Stern (1993), "Retailers' Private Labels Strain Old Ties," *The Wall Street Journal,* September 9, p. B1.

Porter, Michael E. (1976), *Advertising, Structure and Bilateral Market Power.* Cambridge, MA: Harvard University Press.

Raju, Jagmohan, Raj Sethuraman, and Sanjay Dhar (1994), "National Brand - Store Brand Price Differential and Store Brand Market Share," *Pricing Strategy & Practice: An International Journal* (forthcoming).

Sethuraman, Raj (1992), "Understanding Cross-Category Differences in Private Label Shares of Grocery Products." Cambridge, MA: Marketing Science Institute, Report No. 92-128.

_____ and Gerard Tellis (1991), "An Analysis of the Tradeoff Between Advertising and Price Discounting," *Journal of Marketing Research* 28 (May), 160-74.

Stern, Louis W. (1966), "The New World of Private Brands," *California Management Review* 8 (3), 43-50.

Strauss, Gary (1993), "Shoppers Find Value Beyond Big Names," *USA Today,* January 7, p. 1B.

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