Positioning of Store Brands

Serdar Sayman • Stephen J. Hoch • Jagmohan S. Raju
College of Administrative Sciences, Koç University, Rumeli Feneri Yolu, Sariyer, Istanbul 80910, Turkey
The Wharton School, University of Pennsylvania, Suite 1400, Steinberg Hall-Dietrich Hall, Philadelphia, Pennsylvania 19104-6371
The Wharton School, University of Pennsylvania, Suite 1400, Steinberg Hall-Dietrich Hall, Philadelphia, Pennsylvania 19104-6371
ssayman@ku.edu.tr • hochs@wharton.upenn.edu • rajuj@wharton.upenn.edu

We examine the retailer's store brand positioning problem. Our game-theoretic model helps us identify a set of conditions under which the optimal strategy for the retailer is to position the store brand as close as possible to the stronger national brand. In three empirical studies, we examined whether market data are consistent with some of the implications of our model. In the first study, using observational data from two US supermarket chains, we found that store brands are more likely to target stronger national brands. Our second study estimated cross-price effects in 19 product categories, and found that only in categories with high-quality store brands, store brand and the leading national brand compete more intensely with each other than with the secondary national brand. In a third product perception study, we found that although explicit targeting by store brands influenced consumer perceptions of physical similarity, it had no influence on consumers' perceptions of overall or product quality similarity. While it appears that retailers do follow a positioning strategy consistent with our model, it changes buying behavior in the intended fashion only if the store brand offers quality comparable to the leading national brands.

(Store Brands; Private Labels; Positioning; Retailing; Game Theory; Competition)

1. Positioning of Store Brands

Store brands or private labels are created and controlled by retailers. In aggregate they constitute about 20% of unit sales and are among the top three brands in 70% of supermarket product categories (IRI 1998). Although ignored in the past, recent research has improved our understanding of how store brands compete with national brands (e.g., Cotterill et al. 2000, Hoch 1996, Kadiyali et al. 1998, Sudhir 2000). We study store brand (SB) and national brand (NB) competition by considering the positioning strategy of SBs. As is true for any brand, positioning of the SB can exert an important influence on its performance. Unlike manufacturers of NBs, however, the downstream retailer has a different objective function. Whereas NB manufacturers position their products to maximize profits from their own products, the retailer focuses on maximizing profits from the entire product category, including profits from the SB and NBs (Hoch and Lodish 1998). We model how the retailer should position the SB to maximize category profits within the context of a category with two NBs, one of which is stronger. Positioning is operationalized as the per-

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ceptual distance between two brands, where brands positioned closer to each other exhibit a higher cross-price sensitivity. We focus on understanding the conditions under which the SB should target a specific NB, either the leading brand (NB1) or a secondary brand (NB2), or follow an ‘‘in-the-middle’’ positioning and compete to a lesser degree with both NBs. Although we take the retailer’s perspective in this paper, a better understanding of SB positioning strategy also is important to NB manufacturers, who must coexist with SBs.

Schmalensee (1978) noted that SBs often imitate the category leader, presumably to signal comparable quality at a lower price. Although the demand for the SB may increase, the potential downside of this strategy is that the demand for the targeted leading NB may also decrease. Since the retailer also makes money by selling the NBs, it may not be optimal to have the SB specifically compete against the NB with the largest customer base and higher margins (Corstjens and Lal 2000). Instead of targeting a NB that generates substantial profit, adopting a midpoint position where the SB competes to a lesser extent with both NBs may be better. Yet, we often observe retailers targeting leading NBs. The answer to this puzzle lies in a better understanding of the retailer’s objectives and using this understanding to identify the conditions under which the retailer is better off targeting the leading NB.

The product positioning literature usually ignores the retailer. We are aware of only one study incorporating the differences in the objectives of the retailer and the NB manufacturers into the positioning problem. Tyagi and Raju (1998) examine the preemptive positioning strategies of NBs when there is an NB versus an SB entrant. We focus on the SB’s positioning problem and attempt to find the optimal location in both the symmetric case, where both NBs are equally strong, and the asymmetric case, where one NB is stronger than the other. We adopt a game-theoretic approach and examine a market with two incumbent NBs and an SB entrant. SB positioning essentially involves choosing the appropriate perceptual distance between the SB and the NBs. This distance in turn determines the cross-price sensitivity between the SB and each of the NBs. As such, positioning the SB closer to one NB results in a higher cross-price sensitivity between the two.

Our results reveal that SB targeting of the leading NB leads to: (a) lower wholesale prices from both NB1 and to a lesser extent NB2; (b) higher margins for the retailer on NBs; (c) higher profits from the SB; and (d) increased category demand—all of which can add up to increased category profit relative to other positioning strategies. Furthermore, we find that this targeting strategy is relatively more profitable in categories where the leading NB is stronger. Intuitively, targeting the leading NB is another way to minimize the double marginalization problem. Since double marginalization is likely to be greatest for the leading NB, and because the retailer generally offers only one SB, targeting the leading NB is the best strategy for the retailer—under a reasonable set of assumptions.[1] One can argue that in other instances, such as when there exists a price-sensitive segment in the market, it may be better not to target the leading NB and instead to use the SB to target this segment.

In three empirical studies, we find that market and perceptual data are consistent with some of the implications of our analysis. In a field study in two U.S. supermarket chains, we gathered observational data (labeling, package design and color, shelf placement, etc.) regarding the targeting strategies of SBs in various categories. We found that if the SB follows a targeting strategy, the category leader invariably is the target. Furthermore, consistent with the predictions of our model, the probability of a NB being targeted by the SB is an increasing function of its market share relative to that of its competitors. In a second study we used store-level data from A.C. Nielsen to examine demand-price relationships in 19 categories and estimate cross-price effects to assess interbrand competition. When we use elasticity as the price-effect measure, cross-price elasticities do

[1]We thank the former editor, Brian Ratchford, for suggesting this intuition.

suggest that the SB and NB1 compete more intensely with each other than with NB2 in categories with high quality SBs but not in categories where SB quality is low (Bronnenberg and Wathieu 1996). When absolute cross-price effects are used, estimated price effects are consistent with the implications of our analysis in both high and low quality SB categories. In a third study of product perceptions, we found that consumers could detect when SBs targeted a NB; consumers rated the physical similarity of the SB and the NB to be much higher when the targeting was explicit rather than ambiguous. However, explicit targeting had no influence on consumers' perceptions of the overall similarity or product quality similarity of the SB and NB1. In fact, the SB was rated as more similar to the lower share NBs (NB2 and NB3). While it appears that retailers do follow a positioning strategy consistent with our model, it by and large changes buying behavior in the intended fashion only in cases where the SB offers quality comparable to the leading NBs.

2. The Model

We consider a market consisting of two NB manufacturers, each offering one NB sold through a common retailer. The retailer can introduce a SB if it results in higher total category profits for the retailer. Our model extends previous work by Raju et al. (1995) by allowing the retailer also to decide how the SB is positioned relative to the two NBs. Previous studies of brand competition, by and large, account for heterogeneity in consumer preferences using two distinct modeling approaches:

(1) Models such as DEFENDER (Hauser and Shugan 1983) allow for horizontal differentiation. No brand is uniformly better than the other brands; differences in tastes lead consumers to buy different brands. Competition among horizontally differentiated NBs is often modeled by allowing for different consumer ideal points in a Hotelling-type framework (Hotelling 1929).

(2) Moorthy (1985) studies differences among vertically differentiated brands. In this context, if prices are the same, all consumers prefer the brand with higher quality. Competition between a SB and a NB is more like competition between vertically differentiated brands.

Our positioning problem requires simultaneous modeling of the competition among NBs, and the competition between a SB and NBs. The problem is further complicated by the fact that the competitive parties reside at two different levels of the distribution channel, with each party maximizing its respective profits. Consequently, we utilize a reduced form approach, where heterogeneity in tastes and differences among brands are captured through a parsimonious demand model grounded in utility theory.

2.1. Demand Structure Without the Store Brand

The demand for NBi, denoted by q_i, $i = 1, 2$, is assumed to be as follows:

$$q_1 = \frac{1}{a_1 + a_2}[a_1 - p_1 + \theta(p_2 - p_1)], \tag{1}$$

$$q_2 = \frac{1}{a_1 + a_2}[a_2 - p_2 + \theta(p_1 - p_2)], \tag{2}$$

where p_i is the price of NBi, $a_i \in (0, 1)$ is the base level of demand of NBi, and $\theta \in (0, 1)$ is the cross-price sensitivity representing the degree of price competition between the two NBs. The proposed linear demand function is consistent with utility maximizing consumers with quadratic utility functions (Shubik and Levitan 1980). Although a different utility function could lead to another demand structure, and there is conflicting evidence regarding the fit of linear demand to market data (e.g., Bolton 1989, Cotterill and Putsis 2001), we employ the above structure for analytical tractability as well as consistency with previous research (Raju et al. 1995).

The demand structure in (1) and (2) generalizes the demand model used in Raju et al. (1995) as it allows the base level of demand of the two NBs to be different. Overall category demand equals 1 when $p_1 = p_2 = 0$, implying that there is a bound on how much consumers will buy. We also assume that the marginal cost of the NBs to the manufacturers is 0, so, prices are additional to marginal cost.

2.2. Demand Structure with the Store Brand

In addition to the two NBs, we now include the SB denoted by the subscript s in (3)–(5).

$$q_1 = \frac{1}{a_1 + a_2 + a_s} \times \left[a_1 - p_1 + \tfrac{1}{2}\{\theta(p_2 - p_1) + \delta_1(p_s - p_1)\}\right], \quad (3)$$

$$q_2 = \frac{1}{a_1 + a_2 + a_s} \times \left[a_2 - p_2 + \tfrac{1}{2}\{\theta(p_1 - p_2) + \delta_2(p_s - p_2)\}\right], \quad (4)$$

$$q_s = \frac{1}{a_1 + a_2 + a_s} \times [a_s - p_s + \tfrac{1}{2}\{\delta_1(p_1 - p_s) + \delta_2(p_2 - p_s)\}], \quad (5)$$

where p_s is the price of the SB and $a_s \in (0, 1)$ is the base level of demand of the SB. As in (1) and (2), θ is the cross-price sensitivity between the two NBs. In addition, $\delta_i \in (0, 1)$, the price sensitivity between the SB and NBi, captures the extent to which the SB competes with NBi. The δ_is are affected by the positioning of the SB. As in the case with only two NBs, overall category demand equals 1 when $p_1 = p_2 = p_s = 0$. However, in equilibrium the introduction of a SB leads to an increase in category volume due to lower average prices in the category—compared to the no SB case.

Note that (3)–(5) have two price difference terms whereas (1) and (2) contain only one price difference term. The 1/2 outside the weighted sum of the price difference terms in (3)–(5) is a normalization constant to ensure that the mere addition of another brand does not result in higher demand. This normalization also results in a structure where demand is affected by own price and the difference between own price and the (weighted) average price of the competing brands in the product category.

To keep the model tractable, we use the same parameter δ_1 in (3) as well as (5), and δ_2 in (4) as well as (5), implying that cross-price sensitivities are symmetric. In other words, a unit price difference between NB1 and the SB has the same effect on NB1 demand as it has on SB demand. This is consistent with the findings in Sethuraman et al. (1999), where cross-price effects, when measured in absolute terms, are by and large equal. We are not, however, assuming that the cross-price elasticities are symmetric, because elasticities also depend on the demands and shares of the corresponding brands. Linear demand imposes a particular structure on the effect of changes in wholesale prices on retail prices, as noted in Tyagi (1999). We acknowledge that other functional forms may lead to different outcomes but leave this to future research.

2.3. Modeling the Store Brand Positioning Decision

Recall that the parameters δ_1 and δ_2 in (3)–(5) capture the extent to which the SB competes with the two NBs. In our framework, positioning corresponds to choosing δ_1 and δ_2 so as to maximize the retailer's category profits. The parameters δ_1 and δ_2 are determined by the perceptual distance between the SB and the two NBs, respectively. For example, if the SB is positioned right next to NB1, then $\delta_1 = 1$ and $\delta_2 = \theta$. Note that although $\delta_2 = \theta$, corresponding price elasticities between NB2 - NB1 and NB2 - SB are not equal.

In order to formally model the positioning decision, we assume that brands are located in an n-dimensional perceptual space. Let $f(d)$ map the distance between the two brands into cross-price sensitivity. We assume that $f(d)$ has the following characteristics:

(1) f(d) should be a nonincreasing function of d. This property implies that as the distance between the two brands increases, the cross-price sensitivity decreases. That is, d is inversely related to the δ_i's.

(2) As d tends to ∞, f(d) should approach 0. This property implies that if the two brands are positioned very far apart, they do not compete with one another.

(3) As d tends to 0, f(d) should approach 1. This puts an upper bound on δ_i. Recall that the upper bound on θ is also 1.

(4) The same change in d should lead to a greater change in f(d) when d is small. This property assumes that a unit change in the SB's position will have a greater impact on cross-price sensitivity when the SB is closer to a NB than when it is farther away. For example, imagine a product category characterized by a single perceptual dimension, and a brand is located at the origin. It seems reasonable to expect that a move by a second brand from 5 units of distance away to 4 units of distance would have a smaller impact on price competition than a move from 2 units away to 1 unit.

In addition to these four properties, if we restrict $f(d)$ to be monotonic and continuous, then $f(d)$ is a strictly convex function of d. The assumption that $f(d)$ is convex is easy to justify in situations where the NBs are positioned around clusters of consumer ideal points. Lee and Staelin (2000) show that $f(d)$ is convex, even when ideal points are distributed uniformly.[2]

2.4. Effect of Store Brand Positioning on the Marginal Cost of the Store Brand

The marginal cost of the SB can be affected by its intrinsic quality (the ingredients) and also by packaging, labeling, and the like. While these differences are important, we combine the two into one marginal cost parameter in our model. Recall that the marginal cost of the NBs equals zero. For parsimony, we first assume that the marginal cost of the SB also equals zero and does not depend on positioning. Then we assume that the cost to the retailer equals zero when the SB targets a NB, but the SB has a cost advantage when it is positioned in the "middle." More specifically, we assume that the marginal cost of the SB equals $-k_m$ when positioned in the middle. We also study a case where the cost of targeting depends on which NB is being targeted—for the case of asymmetric NBs.

[2]Assume $f(d)$ is linear in $d \in (0, \infty)$. In this case the slope of $f(d)$ has to be negative and finite to satisfy the above conditions. Then it has to intersect with the d axis. Similarly, any strictly concave function has to intersect with the d axis, given the above conditions. Only a strictly convex function can satisfy the four conditions above.

2.5. Some Limitations of Our Model Formulation

We assume that positioning affects cross-price sensitivity but not base level of demand. One could argue that as the SB is positioned closer to an NB, its base level of demand might increase because the NBs probably are positioned closer to consumer ideal points. On the other hand, Lee and Staelin (2000) point out that the base level of demand may in fact decrease in these circumstances. A more general model should allow for changes in δ_1 and δ_2, as well as for changes in base sales as a consequence of positioning decisions, but we assume that positioning affects only cross-price sensitivity and not other attributes such as quality. This is a limitation of our model, but by focusing solely on the effect of positioning on cross-price sensitivity we get a cleaner look at the resultant effects of wholesale prices, demands, and profits.

Our model ignores store competition. Store competition may lower margins on leading NBs as stores price these brands competitively to attract new shoppers. Hence, the additional mileage that a retailer may gain by positioning the SB optimally may be less as retailer margins drop due to store competition. On the other hand, store competition has the potential to increase the power of NB manufacturers vis-à-vis a particular retailer. Therefore, the importance of SB positioning as a means to discipline the NB manufacturer may increase when one takes into account store competition. These as well as many other important consequences of store competition on SB positioning decisions (such as precipitating a price war with the national brands) are not accounted for in our model.

2.6. Sequence of Decisions

The assumed sequence of decisions is as follows:

Stage 1. The retailer positions the store brand (δ_1 and δ_2 are determined).

Stage 2. National brand manufacturers choose their respective wholesale prices w_1 and w_2 to maximize their respective profits.

Stage 3. The retailer chooses retail prices p_1, p_2, and p_s to maximize category profits.

We assume that NB positions are fixed. Although NBs may prefer to reposition, it does not happen often even over the long run (Halstead and Ward 1995). We also do not account for the effect of other marketing variables such as advertising or personal selling.

3. The Analysis

The analysis consists of two parts. First, we consider the symmetric NB's case where base levels of demand for NB1 and NB2 are equal but higher than the base level of demand of the SB, i.e., $a_1 = a_2 = 1 > a_s > a_s^* > 0$. Because we only consider cases where introduction of the SB is ex ante profitable (Raju et al. 1995), base-level demand of the SB is higher than a nonzero cut-off, a_s^*. Consideration of the symmetric NB's case provides insight into why positioning strategy is different when adopting a retailer versus manufacturer perspective. In the second part of our analysis, we examine the asymmetric NB's case where one of the NBs is stronger than the other, specifically, $a_1 > a_2, a_s$.

3.1. Symmetric National Brands ($a_1 = a_2 = 1 > a_s > a_s^* > 0$)

To focus only on demand side issues, we first begin by analyzing a scenario where the marginal cost of the SB to the retailer is zero and does not depend on the positioning strategy, $k_m = 0$.

LEMMA 1. *The optimal SB position lies on the line segment connecting the two NBs.*

Let Π_r denote the retailer's profit. We show in the Appendix that $\partial\Pi_r/\partial\delta_1 > 0$ and $\partial\Pi_r/\partial\delta_2 > 0$.[3] Any point not on the line segment joining the two NBs is dominated because by moving to the line segment we can increase at least one of the δ_is without reducing the other. Lemma 1 has important, nonobvious implications. Although it is commonly believed that one should position a brand to minimize competition, it does not hold when we are talking about the retailer. Because retailer profits increase with δ_1 and δ_2, the retailer benefits by positioning the SB so as to increase competition with the NBs. More competition at the retail level lowers NB power—which is good for the retailer. This basic intuition can also help us further understand the precise positioning strategy of the SB.

PROPOSITION 1. *For the case where base demand of the two NBs are equal but higher than that of the SB ($a_1 = a_2 = 1 > a_s > a_s^* > 0$), it is optimal for the SB to target either one of the NBs rather than to be positioned elsewhere on the line segment joining the two NBs, as long as f(d) is reasonably convex.*

The intuition is as follows. Retailer's profits increase as the δ_is increase. However, from Lemma 1, the optimal position is on the line segment joining the two NBs. If we move the SB on that line segment, δ_1 and δ_2 cannot increase simultaneously. Therefore, the optimal positioning essentially boils down to determining what is the best combination of δ_1 and δ_2. Since Π_r is symmetric with respect to δ_1 and δ_2, the solution is either targeting or midpoint positioning. As f(d) is convex, it is best to increase one of the δ_is to the maximum and the other to its lowest level by targeting one of the NBs. It may be worthwhile to note that Raju et al. (1995) also point out that a higher δ increases the retailer's incentive to introduce a SB. However, in that paper, δ is determined exogenously. In the current paper, δ is endogenous and depends on SB positioning.

Note that Proposition 1 depends on the convexity of the distance function. If f(d) is linear, the optimal position is in the middle—which corresponds to $\delta_1 = \delta_2 = (1 + \theta)/2$. It is worthwhile noting that only a small degree of convexity is sufficient for Proposition 1 to hold. Furthermore, the optimal positioning of the SB is not a continuous function of the convexity of f(d). As soon as the convexity of f(d) increases beyond a critical level, and this critical level is not that high, it is optimal for the SB to target a single NB rather than position anywhere else on the line segment.

[3] An abridged appendix at the end of the paper contains brief sketches of the proofs. A full technical appendix is located on the *Marketing Science* website ⟨http://mktsci.pubs.informs.org⟩.

The retail and wholesale prices of both NBs decrease with the introduction of the SB, but the targeted NB experiences a greater decrease. This is consistent with Halstead and Ward (1995), who report that the most common response of the NBs to the increasing SB threat is to decrease their prices. The introduction of the SB leads to increased retailer margins on the NBs.[4] Furthermore, this increase is larger on the targeted brand. The profits of both NBs decline after SB entry, and the decrease is larger for the targeted NB. Finally, the equilibrium category demand increases, and demand for both NBs decreases with the introduction of the SB because the overall category demand is relatively inelastic. However, the targeted NB does not lose as much demand as the nontargeted NB because of its lower equilibrium price. Overall, targeting an NB results in the optimal level of interbrand competition, which in turn leads to better terms of trade for the retailer, and a more desirable allocation of demand across the three brands that leads to higher profits despite a reduction in sales from the NBs.

We now allow for SB marginal cost to depend on its positioning strategy. Recall that the marginal cost of the NBs is assumed to equal 0. To keep the number of parameters to a minimum, we capture cost of positioning by assuming that SB marginal cost is equal to the marginal cost of the NBs (i.e., 0) when it targets a NB, but it is $-k_m$ when it is positioned in the middle. The main result is reported in Proposition 2.

PROPOSITION 2. *For the case where demand of the two NBs are equal but higher than base demand of the SB, it is optimal for the SB to target either one of the NBs, as long as $f(d)$ is sufficiently convex and k_m is small.*

The maximum value of k_m that can be tolerated before it becomes better to position in the middle increases as $f(d)$ becomes more convex.

[4]When the base level of demand of the SB is very low, the retailer's margins on the NBs do not increase.

3.2. Asymmetric National Brands ($a_1 > a_2,\ a_s$)

Analysis of the symmetric NB's case results in the following key insights:

- The optimal position of the SB is on the line segment joining the two NBs.
- As long as the distance function is reasonably convex, and the cost of targeting a NB is below a threshold, it is best to target one of the NBs. The more convex the distance function, the higher is the cost threshold.

With symmetric NBs, targeting one is equivalent to targeting the other. Once we allow one NB to be stronger than the other as well as the SB ($a_1 > a_2$, a_s), we can resolve the issue of whether it is better to target the strong or weak NB. The main result is summarized in Proposition 3. Note that comparison of profits from targeting NB1 or NB2 is independent of the cost advantage of positioning at the midpoint.

PROPOSITION 3. *If $a_1 > a_2$, a_s, the retailer's profit is higher if the SB targets the leading NB than when it targets the secondary NB.*

Table 1 summarizes the equilibrium expressions for the asymmetric case with the SB targeting NB1; note that a_1 is set to 1, without loss of generality. To understand the intuition, we examine a specific case where $a_1 > a_2 = a_s$, which leads to simpler expressions than those in Table 1. We show that targeting the stronger NB results in lower total NB demand than targeting the weaker NB. Furthermore, targeting the stronger NB results in a lower average wholesale price. These two effects combined result in lower total manufacturer profits on NBs when the SB targets NB1 as opposed to NB2. Hence, targeting NB1 leads to greater profit pressure on manufacturers, allowing the retailer to capture some of what is given up by the manufacturers. Therefore, it is not surprising that we find that the retailer's combined profits from the two NBs are higher when the strong NB is targeted as opposed to the weak NB—as long as $a_s > a_s^*$. Furthermore, retailer profit from the SB is higher when it targets the strong NB as opposed to the weak NB.

Table 1 Equilibria in a Category with Asymmetric Brands

	Without the Store Brand	With the Store Brand
NB1 wholesale price (w_1^*)	$\frac{2+2\theta+a_2\theta}{4+8\theta+3\theta^2}$	$\frac{2(4+4\theta+a_2\theta)}{24+32\theta+7\theta^2}$
NB2 wholesale price (w_2^*)	$\frac{2a_2+\theta+2a_2\theta}{4+8\theta+3\theta^2}$	$\frac{2(6a_2+\theta+2a_2\theta)}{24+32\theta+7\theta^2}$
NB1 retail price (p_1^*)	$\frac{w_1^*}{2}+\frac{1+\theta+a_2\theta}{2+4\theta}$	$\frac{w_1^*}{2}+\frac{6+2a_s+8\theta+2a_s\theta+4a_2\theta+\theta^2+a_s\theta^2+a_2\theta^2}{2(8+14\theta+3\theta^2)}$
NB2 retail price (p_2^*)	$\frac{w_2^*}{2}+\frac{a_2+\theta+a_2\theta}{2+4\theta}$	$\frac{w_2^*}{2}+\frac{8a_2+4\theta+4a_s\theta+6a_2\theta+\theta^2+a_s\theta^2+a_2\theta^2}{2(8+14\theta+3\theta^2)}$
SB retail price (p_s^*)	—	$\frac{2+6a_s+2\theta+8a_s\theta+4a_2\theta+\theta^2+a_s\theta^2+a_2\theta^2}{2(8+14\theta+3\theta^2)}$
NB1 demand (q_1^*)	$\frac{(1+\theta)(2+2\theta+a_2\theta)}{(1+a_2)(8+16\theta+6\theta^2)}$	$\frac{(3+\theta)(4+4\theta+a_2\theta)}{2(1+a_2+a_s)(24+32\theta+7\theta^2)}$
NB2 demand (q_2^*)	$\frac{(1+\theta)(2a_2+\theta+2a_2\theta)}{(1+a_2)(8+16\theta+6\theta^2)}$	$\frac{(2+2\theta)(6a_2+\theta+2a_2\theta)}{2(1+a_2+a_s)(24+32\theta+7\theta^2)}$
SB demand (q_s^*)	—	$\frac{a_s}{2(1+a_2+a_s)}+\frac{4+4\theta+7a_2\theta+\theta^2+2a_2\theta^2}{2(1+a_2+a_s)(24+32\theta+7\theta^2)}$
Retailer's profit (Π_{ro}^*, Π_r^*)	$q_1^*(p_1^*-w_1^*)+q_2^*(p_2^*-w_2^*)$	$q_1^*(p_1^*-w_1^*)+q_2^*(p_2^*-w_2^*)+q_s^*p_s^*$

So far, we have assumed that SB cost is the same whether it targets NB1 or NB2. This is consistent with our basic assumption that the marginal production cost of NBs is equal. Yet, what happens if the marginal cost of SB is lower when it targets NB2 than when it targets NB1? Assume that the SB cost decreases to $-k_2 < 0$ when it targets NB2. What we find is that targeting NB1 is more profitable for the retailer than targeting NB2, as long as k_2 is small. The intuition is straightforward.

It is also of interest to understand how the advantage of targeting NB1 is affected by the relative strength of the two NBs. This result is useful from an empirical perspective. Define Π_r^s as the retailer's profit when the SB targets NB1, Π_r^w as the profit when it targets NB2, and Π_r^m as the profit if the SB is positioned at the midpoint between the NBs.

PROPOSITION 4. *The profit advantage of targeting the strong NB is greater compared to other prospective strategies, if the second NB is weaker. More specifically,*

4.1. $\frac{\partial[\Pi_r^s-\Pi_r^w]}{\partial a_2}<0.$

4.2. $\frac{\partial[\Pi_r^s-\Pi_r^m]}{\partial a_2}<0.$

Proposition 4 states that in categories where NB1 is stronger relative to NB2, targeting NB1 is more advantageous compared to either targeting NB2 or the mid-point positioning. We note that we resorted to numerical analysis to prove 4.2, since Π_r^m depends on $f(d)$ (or $\delta_m = \delta_1 = \delta_2$). We varied a_2, a_s, θ, and δ_m in relevant ranges and checked the sign of the derivative. Our numeric analyses also showed that Proposition 4 holds when the cost of the SB is lower at the midpoint or when it targets NB2.

In the symmetric case, we have shown that targeting one of the NBs is better than being anywhere else on the line (Proposition 1). In the asymmetric case, while we have demonstrated analytically that targeting NB1 leads to higher profits than targeting NB2 (Proposition 3), we were unable to show analytically whether positioning the SB on the line segment results in lower profits than targeting NB1. Retailer profits from targeting NB1 or NB2 do not depend on the precise distance function. However, profits from other positioning choices on the line segment joining the two NBs do depend on the assumed distance function, and comparison of midpoint positioning versus targeting is not sufficient. Unlike the symmetric case, we were not able to derive a general analytic result for the asymmetric case that holds for all distance functions. Therefore, for the asymmetric case, assuming a number of distance functions (e.g., $f(d) = -\exp(d)$, and $f(d) = 1/(1 + d)$ satisfying the conditions above), we conducted numeric analysis, and in all cases, it turned out that targeting NB1 results in higher profits than positioning anywhere else on the line segment joining the two NBs. Even for the linear distance function, which corresponds to the limiting case for convexity, targeting NB1 is optimal unless NB2 is sufficiently strong. This implies that the convexity condition on the distance function weakens when the NBs are asymmetric.

Our analysis shows that by positioning against NB1 retailers can reduce the monopoly power of the leading brand and increase their own relative bargaining power (see Betancourt and Gautschi 1998, Morton and Zettelmeyer 2000). Our results also potentially suggest another solution to the double marginalization problem (e.g., Jeuland and Shugan 1983, Gerstner and Hess 1995, Ingene and Parry 1995), this one initiated by the retailer. Minimizing the effects of double marginalization could benefit the retailer in the long run because it leads to increased joint profits, and a part of this increase can potentially flow to the retailer, depending on the relative bargaining power of the retailer and the manufacturer. Because the double marginalization problem is likely to be most severe for NB1, by targeting NB1, the retailer lowers the monopoly power of the NB1 manufacturer at the wholesale level while retaining some monopoly power over retail prices because it can set retail prices of NBs as well as the SB, all of which are substitutes. Under a reasonable set of conditions, the retailer gains significantly more profit by explicitly targeting NB1 compared to moving only partway towards NB1. These conditions include: (i) The distance function is sufficiently convex (i.e., cross-price sensitivity drops off rather quickly as the SB moves away from an NB). (ii) Cost advantage of not targeting is not too high. If these conditions are not met, or when the retailer is better off using the SB to target a unique segment of the market, one may not observe SB targeting the leading NB. Furthermore, if retail competition is so severe that does not allow the retailer any monopoly power over retail prices, the benefits of targeting the leading NB may not materialize.

4. Empirical Studies

In this section we present three empirical studies that examine whether market and perceptual data are consistent with some of the implications of our analysis.

4.1. Study 1: Observational Data on Store Brand Positioning

A key finding in the theoretical analysis is that the SB should locate next to NB1 if certain conditions are met (Proposition 2). One of these conditions is that the cost of targeting is not beyond a critical level. Because of differences in targeting costs, we may not observe this strategy in all product categories. However, Proposition 4 suggests that all else equal, the relative profitability of targeting NB1 is an increasing function of asymmetry in NB strength; hence, the probability that a SB targets the leading NB should be higher in categories where the leader is stronger.

4.1.1. Data and Methodology. In two leading U.S. grocery chains, two observers collected data regarding the positioning strategies of the SBs. 75 categories were randomly selected from the *Marketing Fact Book* (IRI 1998), ranging from dry grocery to frozen/refrigerated foods and health and beauty aids. Data were eventually collected for 64 of these 75 categories in one chain (Store A) and for 56 categories in the other (Store B). For the remaining categories, there was no SB alternative available. SBs are easily identified by their brand names. Observers evaluated the available extrinsic cues, and judged the positioning strategy of the SB products. The specific extrinsic dimensions used in the evaluation were: (i) package design; (ii) labeling/color; (iii) shelf placement; and (iv) shelf talkers (“Compare and Save” signage)—if any. Prior research has found that consumers evaluate SBs based on such extrinsic cues (Richardson et al. 1994). Each observer independently made a judgment of whether the SB was targeting one particular NB based on a close match on all four extrinsic dimensions.[5] Observers initially agreed 85% of the time. When both observers agreed that the SB was trying to compete with a specific NB, the brand name of the targeted product was recorded. We repeated all analyses on only the categories where both observers agreed a priori and obtained similar results. Examples of clear targeting and ambiguous targeting (or not targeting) are shown in Figure 1.

4.1.2. Results. The SB followed a targeting strategy in 39% of the categories in Store A and 32% in Store B. In the remaining categories, the SB either did not follow a targeting strategy or targeted multiple NBs. Although at first glance the overall level of targeting seems fairly low, the targeting criterion was stringent. Also, it is not that easy for the SB to differentially target one NB in cases where the NBs already look quite similar. In categories where SB targeting occurred, the targeted brand was the leading NB in the category (identified from the *Marketing Fact Book* 1998) 84% and 83% of the time in Store A and B, consistent with Proposition 2 where SBs target the category leader if and when they follow a targeting strategy.

To examine if market data are consistent with Proposition 4, we estimated separate logit models for Stores A and B using targeting strategy of the SB as the dependent variable (1 = leading NB is the target, 0 = otherwise). The key independent variables were the base demands of the leading NBs. We use market shares as the surrogates for base-level demands. We identified the unit market shares of the top two NBs in each category, MS_1 and MS_2, from the *Marketing Fact Book*[6]. We also included two covariates, the number of NBs in the category (#NB) and Category Size (M), to control for other possible explanations for SB targeting strategy. In the first logit model, we use MS_1 as a predictor variable. However, when there are more than two NBs, relative base strength of the leading NB with respect to the secondary NB may be a more realistic measure. MS_1/MS_2 is used as a predictor variable in the second model. MS_1 and MS_1/MS_2 are positively correlated (+0.42 for Store A and +0.73 for Store B).

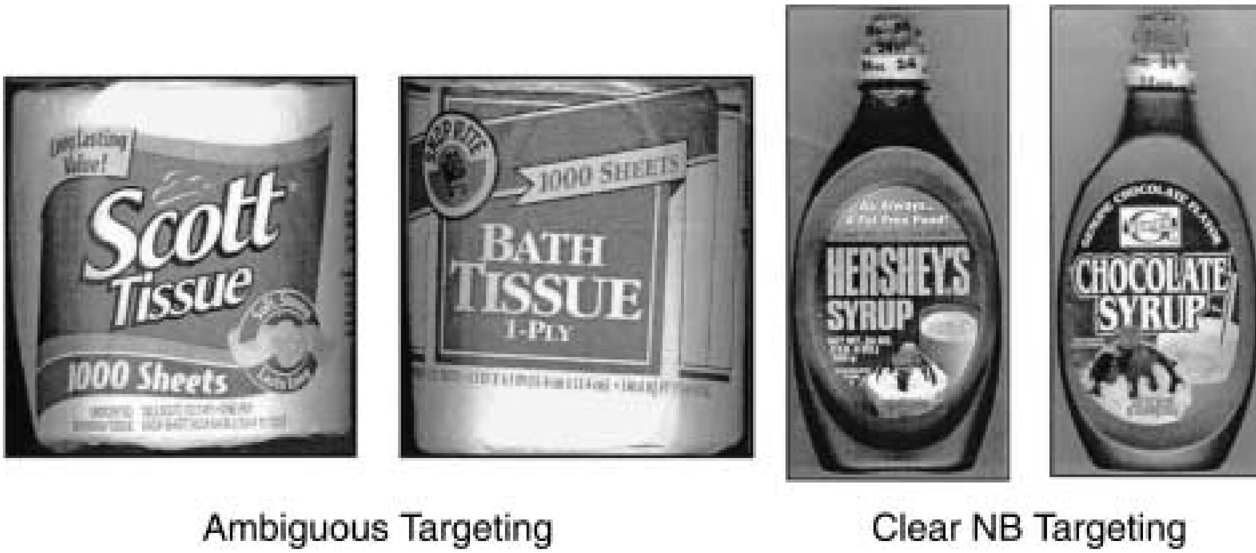
In the first model, MS_1 is the only significant variable for both Store A ($\beta = 7.99$, $p = 0.012$) and Store B ($\beta = 7.26$, $p = 0.016$), and its effect is in the hypothesized direction (results are reported in the technical appendix). In categories where the market share of the leading NB is higher, the probability of observing a SB that targets the leader increases. The effect of MS_1/MS_2 is significant in the second model for Store A ($\beta = 1.32$, $p = 0.006$) and Store B ($\beta = 0.67$, $p = 0.054$). When the leading NB is stronger relative to the underdog, it is more likely to be a target for the SB. The effect of the number of NBs and category size have little impact on SB positioning. To allow for correlated errors across the two stores, we also estimated a probit model for the 53 product categories common to both stores. We allowed store intercepts and the β coefficients to be different for the two stores. The results were very similar to what we found when estimating separate models for each store.

4.1.3. Discussion. Study 1 provides evidence that if the SB follows a targeting strategy, the target is, indeed, the leading NB. We also found that SB targeting strategy depends on the (relative) market share of the leading NB. A limitation of this first study is that it considered only two grocery chains and may not generalize to other retailers. While it seems that retailer actions reported in Study 1 are consistent with our model-based predictions, we cannot claim that they are doing it for the same reasons that are suggested in our model. In other words, Study 1 is

[5]The two observers were not aware of the market shares of the NBs when they collected these data.

[6]Market shares computed at the national level may differ from market shares in these two stores. It turns out that while we do not have access to market shares for these two stores, the chains that these stores are parts of are included in the data used in Study 2. We have market share data for these chains for the market area of which the two stores are a part. We computed rank order correlations between market shares at the chain-market area level with the national-level market shares. The correlation was 0.75. Hence, national-level shares track local shares quite closely.

Figure 1 Examples of Categories with Ambiguous and Clear Targeting



not a formal test of our model. The data in Study 1 also provide no direct evidence on whether the targeting strategy has the intended influence on either consumers' perceptions of the SBs or their buying behavior. A positioning strategy is a means for the retailer; whether or not the SB is successful in competing with the leading brand is still an empirical question. The next two studies address these issues.

4.2. Study 2: Inferring Store Brand-National Brand Competitive Relationships from Secondary Data

Our model predicts that under certain conditions, it is optimal for the SB to choose a position closer to NB1 thereby resulting in greater competition between NB1 and the SB than between NB2 and the SB or NB1 and NB2.

4.2.1. Data and Methodology. We utilized syndicated sales data from A.C. Nielsen for 19 product categories and 122 retailers operating in the top 50 US markets. In each of the categories, a SB was sold by more than 50% of the retailers. For each retailer, the database includes brand-level information (unit sales, prices, and promotions) on a four-week basis for each category over 30 periods (February 1993 through May 1995). As in Study 1, we assume that smaller share brands have limited influence on the SB strategy. To take into account the effects of other NBs, we combined them into an omnibus NB3.

We assume that the SB positioning strategy is determined at the retailer level and not modified over the 30 four-week periods. Therefore, we identified the category leader (NB1), the secondary brand (NB2), and other NBs (NB3) separately for each retailer based on unit sales over the 30 periods. Hence, what we are measuring does not pertain to specific NBs but to NB1 and NB2 in each retailer. For each of the 19 categories, we estimated demand functions for the SB, NB1, and NB2 using a linear specification.[7] Product demand is a function of the retail prices and sales promotions.

We use the following notation. Let $i = 1, 2,$ and 3 refer to national brands, and s refer to the SB. The subscript $r = 1, \ldots, 122$ refers to the 122 different retailers in the data. Finally, the subscript $t = 1, \ldots, 30$ represents each of the four-week periods over which we have the data. Our key measures are defined next.

[7]Results using a double-log specification produced similar results.

Demand for National Brand i (Q_{irt}). We use equivalent units as the basis for demands. Hence, the demand for a NB is the pound (or ounce) sales. $i = 1$ designates the leading NB based on the sales in retailer r, and $i = 2$ is the secondary NB. The demand for NB3, $i = 3$, is the sum of the demands for the other NB products in the category.

Demand for the Store Brand (Q_{Srt}). Likewise, we use the equivalent unit sales of the SB in the analysis. In the 19 categories employed here, SBs are present in 75% of the retailer-category combinations. Conditional on the presence, the average SB share across categories and retailers is 28%.

Retail Prices (P_{irt}, P_{Srt}). Retail prices are also based on equivalent units. Equivalent unit prices are obtained by dividing the dollar sales by the number of equivalent units. As is standard when computing prices for brands made up of numerous individual SKUs, the prices are defined as the geometric share average or the Divisia price index of all the UPCs that make up that brand. P_{3rt} is the weighted average price of the other NBs. The prices are effective prices net of promotions rather than regular prices.

Promotional Intensities (S_{irt}, S_{Srt}). We use the fraction of equivalent unit sales accompanied by any kind of retail promotions as a measure of promotional activity by the brands. Because sales promotions are often accompanied by a price reduction, there is some degree of negative correlation between the promotion intensity variables and the corresponding price. However, these simple correlations are less than 0.2 in magnitude. We note that S_{3rt} is the fraction of "other brands" basket sold on deal.

Indicator for Retailers (R_r). We included these dummy variables to account for the variation in demand across retailers. Basically $R_r = 1$ if the data point comes from retailer r, and 0 otherwise. More detailed discussion will be presented below.

It is worthwhile to keep in mind that prices and promotional variables may be determined endogenously. While prices and promotions are usually set in advance in retail settings, we address the possible endogeneity of the promotion variables by using instruments. Specifically, observations of the promotional intensity variables for a particular retailer are the averages of promotional intensities from other retailers (Cotterill et al. 2000, Nevo 2001).

The empirical model we estimate is derived from our theoretical model. The three demand equations outlined in (3)–(5) can be rewritten as follows:

$$q_1 = \frac{1}{a_1 + a_2 + a_s} \times \left[a_1 - \left(1 + \frac{\theta}{2} + \frac{\delta_1}{2}\right)p_1 + \frac{\theta}{2}p_2 + \frac{\delta_1}{2}p_s\right], \tag{6}$$

$$q_2 = \frac{1}{a_1 + a_2 + a_s} \times \left[a_2 + \frac{\theta}{2}p_1 - \left(1 + \frac{\theta}{2} + \frac{\delta_2}{2}\right)p_2 + \frac{\delta_2}{2}p_s\right], \tag{7}$$

$$q_s = \frac{1}{a_1 + a_2 + a_s} \times \left[a_s + \frac{\delta_1}{2}p_1 + \frac{\delta_2}{2}p_2 - \left(1 + \frac{\delta_1}{2} + \frac{\delta_2}{2}\right)p_s\right]. \tag{8}$$

As such, we estimate the following models for each of the 19 product categories:

$$Q_{1rt} = \sum_r \lambda_r^1 R_r + \beta_S^1 P_{Srt} + \beta_1^1 P_{1rt} + \beta_2^1 P_{2rt} + \beta_3^1 P_{3rt} + \alpha_S^1 S_{Srt} + \alpha_1^1 S_{1rt} + \alpha_2^1 S_{2rt} + \alpha_3^1 S_{3rt}, \tag{9}$$

$$Q_{2rt} = \sum_r \lambda_r^2 R_r + \beta_S^2 P_{Srt} + \beta_1^2 P_{1rt} + \beta_2^2 P_{2rt} + \beta_3^2 P_{3rt} + \alpha_S^2 S_{Srt} + \alpha_1^2 S_{1rt} + \alpha_2^2 S_{2rt} + \alpha_3^2 S_{3rt}, \tag{10}$$

$$Q_{Srt} = \sum_r \lambda_r^S R_r + \beta_S^S P_{Srt} + \beta_1^S P_{1rt} + \beta_2^S P_{2rt} + \beta_3^S P_{3rt} + \alpha_S^S S_{Srt} + \alpha_1^S S_{1rt} + \alpha_2^S S_{2rt} + \alpha_3^S S_{3rt}, \tag{11}$$

where Q, P, and S represent demand, price, and availability of sales promotions respectively. Retailer indicator variables capture the differences in base levels of demand due to possible differences in consumer demographics, retail competition, etc. β_i^j is the effect of the price of Brand i on the demand of Brand j. For example, β_1^s represents the effect of NB1's price on SB demand.

Equations (9)–(11) are estimated separately, and they designate the demands for the leading NB, the secondary NB, and the SB. We estimated the cross-price effects using two alternative specifications. In the first specification, demand and price terms are normalized with respect to their averages within respective retailers (i.e., $Q_{irt}/Q_{ir\cdot}$ and $P_{irt}/P_{ir\cdot}$). Hence, β_i^j coefficients correspond to price elasticities. In the second specification, absolute price effects are estimated. Sethuraman et al. (1999) point out the limitations of using elasticities as means to study asymmetric competitive effects, and they suggest that absolute effects should be examined as well. Following the procedure used in Sethuraman et al. (1999), demand terms are replaced with the market shares of each of the brands. Therefore, the β_i^j coefficients are the absolute cross-price effects.

Prior research (Bronnenberg and Wathieu 1996; Dhar and Hoch 1997) has shown that the quality of the SB is a key determinant of performance. Therefore, we a priori divided the categories into high-quality ($n = 10$) and low-quality ($n = 9$) groups using data from Hoch and Banerji (1993).[8] Our main interest here is the β_i^j terms ($j = 1, 2, s$, and $i = 1, 2, 3, s$). To summarize the results for the high and low SB quality groups, we combined the β_i^j estimates for each group of categories by weighting each coefficient according to its precision (the inverse of its standard error squared). In all, for both the elasticity and absolute effects specifications we obtained a total of twelve $\overline{\beta}_i^j$s for the high and low quality SB groups. Our focus is on the 6 cross-price terms that characterize the extent of price competition between NB1, NB2, and the SB. Recall that when the SB targets the leading NB, it follows that $\delta_1 = 1$ and $\delta_2 = \theta$. Furthermore, θ is less than 1 and so $\delta_1 > \delta_2 = \theta$. Keeping these in mind, Equations (6)–(11) suggest the following inequality: $\{\beta_s^1, \beta_1^s\} > \{\beta_2^1, \beta_2^s, \beta_s^2, \beta_1^2\}$.

4.2.2. Results. R^2s from the elasticity and absolute effects regression models provide little information about the goodness of fit of the individual category level models because of the inclusion of the retailer constants. To assess fit, we converted the (normalized) demand and market share figures—estimated from the elasticity and absolute effects models, respectively—into unit sales. Average simple correlations between the actual and estimated sales are 0.95 and 0.98.

The estimated cross-price effects are compared with the main predictions of our model in Table 2. We compared β_s^1 and β_1^s to β_2^1, β_2^s, β_s^2, and β_1^2, and so for each of the high- and low-quality category groups there are eight pairwise comparisons. Beneath the average coefficients, we also report a summary of the same set of pairwise comparisons using the individual category-level estimates. Specifically, we report the percentage of individual category models where β_s^1 and β_1^s are greater than β_2^1, β_2^s, β_s^2, and β_1^2. An examination of the combined estimates indicates that all eight pairs of coefficients are significantly different from each other ($p < 0.05$) for both high and low quality categories, irrespective of whether the coefficients are price elasticities or absolute price effects. However, when we examine the results more carefully, we can see that there are differences depending on whether the SB quality is high or low.

First, let us focus on the categories with higher quality SBs; the results are consistent with our predictions when using both elasticities and absolute price effects. Price competition is greater between NB1 and the SB than between NB1 and NB2 and between the SB and NB2. This holds for the average coefficients and for a majority of the individual-level category estimates. One striking result is that the effect of SB price on NB1 demand (β_s^1) is more than both the effect of NB2 price on NB1 demand (β_2^1) and NB1 price on NB2 demand (β_1^2). We say striking because this is inconsistent with prior price-quality tier research (e.g., Allenby and Rossi 1991, Blattberg and Wisniewski 1989) that generally has found smaller effects of SB prices on the demands of higher tier NBs. Overall, the effects for high quality SBs are consistent with our conjecture that the SB is positioned closer to NB1.

[8]Hoch and Banerji's (1993) measure of SB quality is based on a survey of retail experts (quality assurance managers) from 50 leading chains and wholesalers.

Table 2 Average Estimated Cross-Price Effects in Study 2

	$\{\beta_s^1,$	$\beta_1^s\}$	$\{\beta_2^1,$	$\beta_2^s,$	$\beta_s^2,$	$\beta_1^2\}$
High-Quality Categories						
Price elasticities	0.241	0.237	0.080	0.145	0.193	0.202
% of $\beta_s^1 > \beta_1^j$			70%	70%	50%	70%
% of $\beta_1^s > \beta_1^j$			80%	90%	70%	50%
Absolute price effects	0.197	0.152	0.086	0.088	0.058	0.078
% of $\beta_s^1 > \beta_1^j$			90%	100%	100%	90%
% of $\beta_1^s > \beta_1^j$			90%	90%	90%	90%
Low-Quality Categories						
Price elasticities	0.011	0.467	0.084	0.229	0.101	0.159
% of $\beta_s^1 > \beta_1^j$			33%	22%	33%	33%
% of $\beta_1^s > \beta_1^j$			89%	89%	67%	77%
Absolute price effects	0.073	0.129	0.040	0.044	0.048	0.047
% of $\beta_s^1 > \beta_1^j$			55%	89%	67%	67%
% of $\beta_1^s > \beta_1^j$			77%	89%	77%	67%

The results for the categories with low-quality SBs are less supportive of our model, at least in the case of price elasticities. An examination of the price elasticities for low quality show that prices of both NBs have a greater impact on SB demand than vice versa. Moreover, the SB appears to compete more with NB2 than with NB1. In contrast, the absolute price effects for the low-quality categories are more consistent with our SB positioning story, as both β_s^1 and β_1^s are greater than β_2^1, β_2^s, β_s^2, and β_2^1. The differences in elasticity estimates and estimates of absolute effects have also been noted in Sethuraman et al. (1999).

To avoid potential econometric difficulties that could arise due to aggregating across heterogeneous retailers, we also estimated models at the individual retailer. Due to sparse data (30 observations/retail account), we identified the 5 largest multimarket retailers that operated in a minimum of 5 different markets (30 periods $\times$ 5+ markets = 150+ observations/retailer). We estimated the models in Equations (9)–(11) separately for each retailer and included market-level dummies. The results are similar to that reported above.

4.2.3. Discussion. Overall, Study 2 offers some support for our model. In categories with higher-quality SBs, it does appear that the SB and NB1 compete with each other to a greater extent than they do with NB2. Such is not the case for the low-quality SB categories when elasticity is used as the measure of price effects. These results are robust to the exact model specification. It does not matter whether we estimate the model aggregating across all retailers or at the individual-retailer level. It does not matter whether we estimate cross-price elasticities or absolute cross-price effects (Sethuraman et al. 1999). In fact, our predictions also hold in low-quality SB categories if absolute cross-price effects are considered.

What might explain the difference between the high- and low-quality SB categories? One possibility is that retailers pursue different positioning strategies, depending on the quality of the SB that they can procure. When they can buy a SB that is comparable to NB quality, they follow the predictions of our model and position against the leading NB. When SB quality cannot match that offered by the NBs, the retailer treats the SB as an inferior good and positions it against the weaker NBs. Alternatively, let us assume that the retailer follows the dictates of our model irrespective of SB quality, always positioning against the leading NB. The observed results for low quality categories could also arise if the consumer simply does not accept the position that the retailer stakes out for their SB. In this case consumers may readily perceive the retailer's intent to position the SB against NB1 based on extrinsic characteristics but still not accept that the SB offers a similar level of intrinsic product quality. We address these issues in Study 3.

4.3 Study 3: Store Brand Positioning and Consumer Perceptions

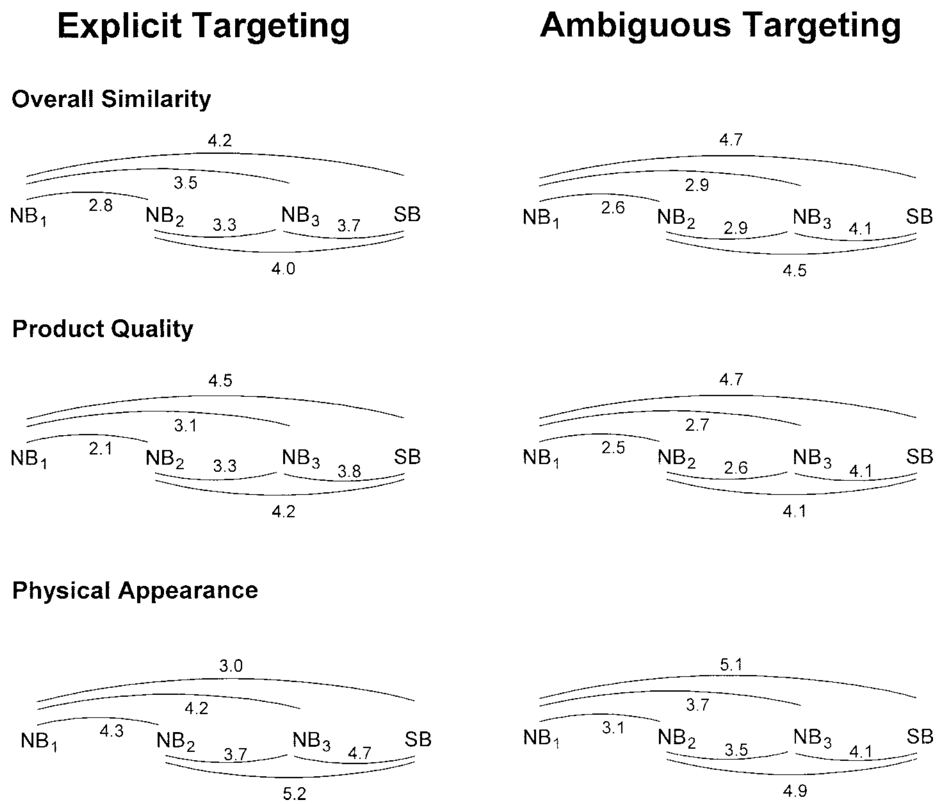
4.3.1. Method. The task required consumers to judge the similarity between the top three NBs and the SB in eight different product categories. Respondents were 102 primary shoppers in households recruited through a local PTA. The categories were yogurt, tomato sauce, toilet paper, canned peaches, canned tuna, chocolate syrup, peanut butter, and skin lotion. The SBs came from two local supermarket chains; 90% of respondents indicated that they had shopped at both stores within the past year. For each category respondents saw color pictures of the brands lined up four across the page (similar to Figure 1) and then made one of three similarity ratings for each of the {4 choose 2} = 6 pairs: (1) "How similar overall are the following pairs of brands?", (2) "How similar are the following pairs of brands in terms of product quality?", and (3) "How similar are the following pairs of brands in terms of physical appearance?" Similarity rating were assessed on a 1 = very similar to 7 = very dissimilar scale; type of rating task was manipulated between subjects.

There also were three within-subjects manipulations. The first variable was whether or not the SB targeted one specific NB. Using data from Study 1 we selected four categories where the SB clearly targeted one of the NBs, in all cases here NB1; in the other four categories, there was no clear target. The second variable was the location of the SB relative to NB1 in the visual stimuli. Either the SB was put adjacent to NB1 (NB2, NB1, SB, NB3), or it was separated (NB1, NB2, NB3, SB). Although this manipulation had absolutely no impact, we thought a priori that adjancency might increase similarity. Finally, we manipulated the price differential between NB1 and the SB; either the SB sold at a 15% or 30% discount to NB1. Again, although this variable also had no impact on similarity ratings, we thought that consumers would be more likely to believe that SB quality was comparable to that of NB1 when the price differential was smaller. To summarize, the overall design was a 3 rating tasks × 6 brand pairs × 2 levels of targeting × 2 levels of location × 2 levels of price-mixed design where the four categories for each level of targeting were rotated across the 2 levels of location and price according to a Latin square. Rating task was a between subjects variable and level of targeting, price differential, and location were within subjects. We also collected supplemental information about SB familiarity, usage, and attitudes.

4.3.2. Results. Although the design is complicated, the results are robust, simple, and therefore easy to interpret. The results are displayed graphically in Figure 2. The six pairwise similarity judgments are broken down by type of rating task: overall similarity, product quality similarity, and physical appearance similarity. For purposes of comparing individual means, the critical range is 0.35. As mentioned previously, there are no significant main effects or interactions effects due to the price or location manipulations. The key effect is a significant interaction between rating task, brand pair, and the targeting variable, $F_{10,4794} = 5.64$, $p < 0.0001$. Similarity ratings differ systematically depending on the rating task and whether SB targeting is explicit or ambiguous. Both the overall similarity and product quality similarity ratings produce comparable results and do not differ systematically, depending on the targeting variable. Specifically, all of the NBs are seen as fairly similar (mean of 3.0 for overall and 2.7 for quality similarity). In contrast, the SB is viewed as less similar to each of the NBs (mean = 4.2), especially NB1 (mean = 4.5). The results for overall and product quality similarity do not differ much whether the SB explicitly targeted NB1 or targeting was ambiguous.

It is only in the case of physical appearance that explicit targeting has any impact. Specifically, when the SB purposefully targets NB1, consumers readily detect the similarity in physical appearance (3.0 vs. 5.1).

Figure 2 Similarity Ratings Depending on Explicit Targeting of NB1 from Study 3



In addition, targeting reduces perceived similarity between the SB and both NB2 (5.2 vs. 4.9) and NB3 (4.7 vs. 4.1). Finally, because perception data are influenced by relative context, targeting also reduces perceptions of similarity between NB1 and both NB2 (4.3 vs. 3.1) and NB3 (4.2 vs. 3.7). Table 3 shows a simplified view of the data focusing on similarity ratings of SB and NB1 and the average of the similarity ratings of the SB with NB2 and NB3. Again the three-way interaction between similarity type, brand pair, and targeting is significant, $F_{2,1530} = 6.92$, $p < 0.001$. Explicit targeting of NB1 by the SB has two effects: Respondents see the SB as more similar to NB1 and less similar to NB2 and NB3 but only in the case of physical appearance. In contrast, explicit targeting does not produce the intended effect on perception of overall similarity or product quality, as the SB is viewed as

Table 3 Similarity Ratings of the SB with NB1 and NB2 & NB3

	Explicit NB1 Targeting		Ambiguous Targeting	
Type of Similarity	NB1 vs. SB	NB2 & NB3 vs. SB	NB1 vs. SB	NB2 & NB3 vs. SB
Overall	4.2	3.9	4.7	4.3
Product quality	4.5	4.0	4.7	4.1
Physical appearance	3.0	5.0	5.1	4.5

Note: Low numbers indicate greater perceived similarity.

slightly more similar to the secondary brands than to NB1. This is also the case when the targeting is ambiguous.

4.3.3. Discussion. The overall picture that emerges from Study 3 is as follows. When the retailer specifically targets the leading NB using physical cues, such attempts do succeed to the extent that consumers easily perceive the proximal position of the SB relative to NB1 in the physical similarity space. Moreover, this positioning tactic also tends to distance both the SB and NB1 from the other NBs. However, it appears that consumers interpret this physical-cues-based positioning in a very literal and narrow manner. What does not happen is discernible carryover from physical appearance space to perceptions of either product quality similarity or overall similarity. Explicit targeting had no influence on consumers' perceptions of the SB and NB1 in terms of overall similarity or product quality similarity. In fact, the SB was rated as more similar to the lower share NB2 and NB3.

At first glance, these results might appear contradictory to our model. We believe, however, that they provide useful advice to the retailer, cautioning against attempts to position onto NB1 solely through the use of superficial appearance cues. Market data in Study 2 is consistent with SB positioning next to NB1—at least when SB quality is high. In terms of our model, this suggests that the cost of successfully positioning against NB1 may be more expensive than it appears. Not only will the retailer incur additional variable costs associated with higher quality ingredients, but also they may need to offer steep discounts to encourage product trial and overcome consumer scepticism. Alternatively, the retailer may incur substantial fixed costs to successfully position next to NB1. Loblaw's successfully convinced Canadian consumers that their President's Choice line was just as good or better than the leading NB's, but doing so required a substantial investment in marketing support.

5. Conclusions

Retailers are, or at least should be, interested in category profits rather than the profit from any specific brand. In this paper, we examined how the retailer's objective function reveals itself in the optimal positioning strategy of the SBs. Our contribution is two-fold. On the theoretical side, we address the SB positioning problem. On the empirical side, we provide evidence that SBs in fact aspire to compete with the category leader, although there is mixed evidence that they are successful in doing so.

We frame the retailer's positioning decision as choosing the degree of competition between the SB and each of the NBs in the product category. Assuming a category with two NBs, we find that when certain conditions identified in our model hold, the SB should be positioned closer to the leading NB. These conditions include the following: (i) The distance function is sufficiently convex (perceptual distance increases rapidly as the SB is moves away from the targeted NB and so distance will have a less pronounced effect on the cross-price sensitivity). (ii) The cost advantage of not targeting is not too high. If these conditions are not met, or when the retailer is better off using the SB to target a unique segment of the market, one may not observe SB targeting the leading NB.

We examined whether the implications of the model are consistent with market data by conducting three empirical studies. We provide evidence that SBs indeed target the leading NB in the category (Study 1). We also analyze demand-price relationships in nineteen categories and find support for our conjecture that optimal positioning leads to greater competition between the SB and the leading NB—with stronger evidence from categories with high-quality SB alternatives (Study 2). We find that even though consumers can readily detect retailers' efforts to use extrinsic cues to position against the leading NB, this knowledge does not necessarily translate into consumer perceptions that the SB offers comparable intrinsic quality (Study 3).

Our analysis indicates that the retailer prefers to have a SB that competes heavily with the NBs. The basic premise here is that it cannot increase both cross-price sensitivities δ_1 and δ_2 at the same time. The conceptual space in which the positioning game takes place allows us to represent the trade-off between δ_1 and δ_2. In the presence of this trade-off, it is better to have a high δ_1 than a high δ_2. Hence, there is a rationale for the tendency of SBs to imitate the category leader.

We model competition among the various competing brands using a reduced form framework that captures aspects of both vertical and horizontal differentiation. However, the reduced form model does not explicitly account for the presence of specific consumer segments. This is a limitation of our model. A limitation of our empirical analysis is that we combine many brands to form NB3 that, as pointed out by Sethuraman et al. (1999), may have undesirable consequences on the cross-price estimates.

There is empirical evidence that SBs do particularly well in categories with high concentration (Dhar and Hoch 1997). Rubel (1995) suggests that SBs do better because it is easier for consumers to compare the SB when there is a distinct category leader. Dhar and Hoch (1997) argue that the SB can pursue a focused positioning strategy in a concentrated market characterized by less heterogeneity in tastes and offer an attractive alternative with a lower price. Our analysis is in line with that of Dhar and Hoch (1997), and we claim that if some conditions are met, the focus of that positioning strategy should be the leading NB.

One can visualize scenarios in which targeting the leading NB may not be the optimal strategy. For example, if the secondary NB provides a much lower margin than the leader, the retailer may be better off by diverting the sales of the secondary NB to the SB. When there exists a price-sensitive segment that values price over quality, it may be better to position the SB to specifically attract these buyers. Alternatively, in some categories targeting strategy may lead to negative inferences; consumers may prefer to buy the ‘‘real thing’’ rather than the ‘‘lower quality copycat’’. In this case, the retailer may choose to make its brand as distinct as possible. It is also possible that being closer to the customer may help the retailer identify the unfulfilled needs or a niche market, thus leading to a differentiated product strategy.

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Appendix: Sketch of Proofs of Key Propositions[9]

Sketch of Proof of Lemma 1. To show that the retailer’s category profit is higher when the SB is on the line segment connecting the NBs, we first obtain the category profit for any δ_1 and δ_2. We start from Stage 3 and proceed backwards. The retailer’s category profits are given by $\Pi_r = q_1(p_1 - w_1) + q_2(p_2 - w_2) + q_2p_s$. The retailer chooses p_1, p_2, and p_s to maximize category profits. This is reflected in the first-order conditions,

$$\frac{\partial \Pi_r}{\partial p_1} = 0, \qquad \frac{\partial \Pi_r}{\partial p_2} = 0, \quad \text{and} \quad \frac{\partial \Pi_r}{\partial p_s} = 0.$$

We use these to solve for p_1, p_2, and p_s in terms of w_1 and w_2 and substitute these in the demand function to get the demands in terms of the wholesale prices. In Stage 2, NB manufacturers choose their wholesale prices simultaneously to maximize their respective profits; $\Pi_1 = q_1w_1$ and $\Pi_2 = q_2w_2$. This is reflected in the first-order conditions

$$\frac{\partial \Pi_1}{\partial w_1} = 0 \quad \text{and} \quad \frac{\partial \Pi_2}{\partial w_2} = 0.$$

We solve these and using w_1 and w_2, we write the demands, retail prices, and retailer’s profit prior to positioning (Stage 1) as a function of model parameters. In the symmetric case, we set $a_1 = a_2 = 1$ and $\Pi_r = f(a_s, \delta_1, \delta_2, \theta)$. We then take the derivative of Π_r with respect to δ_1. We find that $\partial\Pi_r/\partial\delta_1 = f_1(\cdot)/f_2(\cdot)$ where $f_2(\cdot)$ is strictly positive, and $f_1(\cdot)$ can be negative for a subset of parameter values. We show that $\partial f_1(\cdot)/\partial a_s > 0$, i.e., $f_1(\cdot)$ is increasing in a_s. We find that $a_s > 0.3$ is a sufficient condition that will ensure that $f_1(\cdot)$ is positive and therefore $\partial\Pi_r/\partial\delta_1 > 0$ if $a_s > a_s^*$.

Similarly, if $a_s > 0.3$, then $\partial\Pi_r/\partial\delta_2$ is positive. Hence, the retailer prefers higher δ_1 and δ_2—as long as $a_s > a_s^* = 0.3$. Higher δ_1 and δ_2 mean smaller distances to NB1 and NB2 respectively. Using triangle inequality we show that for any point outside the line segment joining the NBs, it is possible to find a corresponding point on the line that has a smaller distance to NB2, for example, keeping the distance to NB1 constant. Therefore, retailer’s profit is higher if the SB is on the line segment connecting the NBs than outside.

[9] This appendix contains brief sketches of the proofs. Complete proofs are in a technical appendix available on the *Marketing Science* website ⟨http://mktsci.pubs.informs.org⟩.

SKETCH OF PROOF OF PROPOSITION 1. We first examine the condition for a profitable SB introduction. According to Lemma 1, optimal SB location is on the line segment joining the two NBs. Therefore, it is sufficient to take a point on this line segment and compare the retailer's profit in this case with the profit without a SB. Let us assume that the SB is positioned right next to a NB. If the retailer's profit is higher with that positioning compared to not having a SB, then profit should be higher for the optimal positioning as well. Let Π_r^t denote the retailer's profit when the SB is positioned next to the first NB. Π_r^t is obtained by substituting $\delta_1 = 1$ and $\delta_2 = \theta$ into Π_r. Retailer's profit without a SB is denoted by Π_{ro}; in this case, the game consists of setting the wholesale and retail prices of the NBs. We obtain $\Pi_r^t - \Pi_{ro} = f_3(\cdot)/f_4(\cdot)$ where $f_4(\cdot)$ is strictly positive, and $f_3(\cdot)$ can be negative or positive. We show that $\partial f_3(\cdot)/\partial a_s > 0$; hence, a higher base demand for the SB makes the introduction profitable. The critical value of a_s—above which introduction of the SB is profitable for the retailer—depends on θ.

Because the incumbent NBs are symmetric, Π_r is symmetric with respect to δ_1 and δ_2: $\Pi_r(\delta_1, \delta_2, \theta) = \Pi_r(\delta_2, \delta_1, \theta)$ for any δ_1, δ_2. Therefore, $\delta_1 = \delta_2 = \delta_m$ has to be the extremum. This corresponds to the midpoint of the line segment, and δ_m depends on $f(d)$. There are three mutually exclusive cases:

(i) Positioning the SB at the midpoint leads to less category profits than positioning at any other point on the line. Thus, either of the end points of the line (that is, targeting either of the NBs) is the optimal location.

(ii) Positioning the SB at the midpoint maximizes category profits.

(iii) Retailer's profit is the same for any point on the line.

Therefore, we compare the profits from targeting and midpoint positioning. Category profit with the targeting strategy, Π_r^t, is the same whether the first or the second NB is the target. Assuming NB1 is the target, we substitute $\delta_1 = 1$ and $\delta_2 = \theta$ in Π_r to obtain Π_r^t. The retailer's profit from positioning the SB in the middle, Π_r^m, is obtained by substituting $\delta_1 = \delta_2 = \delta_m$ in Π_r, where δ_m depends on the distance function $f(d)$. Hence, retailer profits from targeting can be higher than profits from midpoint positioning depending on δ_m or $f(d)$. If we take the derivative of Π_r^m with respect to δ_m, we find that $a_s > a_s^* = 0.3$ is a sufficient condition that ensures $\partial\Pi_r^m/\partial\delta_m > 0$. Basically, Π_r^m is increasing in δ_m, and Π_r^t does not depend on δ_m. Hence $\Pi_r^t - \Pi_r^m$ decreases with increasing δ_m.

We then look at the relationship between Π_r^m and the convexity of the distance function $f(d)$. When the SB moves from NB1 next to NB2, δ_1 decreases from 1 to θ. The convexity of the distance function $f(d)$ implies that $\delta_m < (1 + \theta)/2$. Roughly speaking, higher δ_m implies a lesser degree of convexity of $f(d)$. To examine the limiting case, if we assume that $f(d)$ is linear in the interval corresponding to $(\theta, 1)$ and let $\delta_m = (1 + \theta)/2$, we find that midpoint positioning is more profitable than targeting. This means that targeting will be profitable only if $\delta_m < \delta_m^* < (1 + \theta)/2$. We are not able obtain a closed-form solution for δ_m^*—the critical value of δ_m where the solution changes. The ratio $\delta_m^*/[(1 + \theta)/2]$ is a measure of how close $f(d)$ should be to linearity in order to make a midpoint positioning strategy more profitable than targeting; as a sufficient condition we find that $\delta_m^*/[(1 + \theta)/2] > 0.80$. Therefore, for any $f(d)$ with the corresponding δ_m, if $\delta_m/[(1 + \theta)/2] < 0.80$, targeting is better than midpoint positioning. We emphasize that this phenomenon is a (sufficient) conservative constraint, which leads us to the following conclusion: As long as $f(d)$ is reasonably convex and $a_s > a_s^* = 0.3$, targeting yields higher profits than the midpoint positioning strategy.

SKETCH OF PROOF OF PROPOSITION 2. The analysis is the same as in the proof of Proposition 1, except that now the retailer's category profit is $\Pi_r = q_1(p_1 - w_1) + q_2(p_2 - w_2) + q_s(p_s - k)$, where k depends on the position of the SB. If the SB targets a NB, $k = 0$, and category profit, Π_r^t is the same as in the previous analysis. If the SB is positioned at the midpoint, $k = -k_m < 0$, and the retailer's margin from the SB becomes $(p_s + k_m)$. From the previous section we know that Π_r^t, is larger than Π_r^m, if $k_m = 0$ and $\delta_m < \delta_m^*$. Because Π_r^t does not depend on k_m and δ_m, we examine how Π_r^m changes with k_m and δ_m. We show that $\partial\Pi_r^m/\partial k_m > 0$ for any $a_s > 0$, and $\partial\Pi_r^m/\partial\delta_m > 0$ if $a_s > 0.3$—as in Proposition 1, this phenomenon is a conservative (sufficient) condition.

Therefore, Π_r^m increases with increasing k_m and δ_m, whereas Π_r^t does not depend on k_m and δ_m. For a given $\delta_m < \delta_m^*$, there exists a k_m^* such that a $k_m > k_m^*$ will make midpoint positioning more profitable. Using implicit function theorem, we show that

$$\frac{\partial k_m^*}{\partial \delta_m} = -\frac{\partial F_{\delta_m}}{\partial F_{\delta_m}} < 0 \quad \text{where } F(k_m^*, \delta_m, \theta) = \Pi_r^t - \Pi_r^m = 0.$$

In other words, if the cost advantage of midpoint positioning is high, a "more" convex distance function (smaller δ_m) will still lead to targeting as the optimal positioning strategy.

SKETCH OF PROOF OF PROPOSITION 3. As with the symmetric case, we first need to obtain the retailer's profit for any δ_1 and δ_2. We start from Stage 3 and proceed backwards to obtain the retailer's profit prior to the positioning stage. To obtain the profit from targeting NB1, we substitute $\delta_1 = 1$ and $\delta_2 = \theta$ into Π_r (we also set $a_1 = 1$ without losing any generality). Let Π_r^s represent profit from targeting the stronger NB. Similarly, substituting $\delta_1 = \theta$ and $\delta_2 = 1$ into Π_r and setting $a_1 = 1$, we obtain the retailer's profit from targeting NB2—represented by Π_r^w. We are able to show that $\Pi_r^s - \Pi_r^w > 0$. Therefore, $\Pi_r^* = \Pi_r^s$

SKETCH OF PROOF OF PROPOSITION 4. Using the expressions for Π_r^s and Π_r^w from the proof of Proposition 3, we take the derivative of $(\Pi_r^s - \Pi_r^w)$ w.r.t. a_2 and show that $\partial(\Pi_r^s - \Pi_r^w)/\partial a_2 < 0$, because $\theta < 1$. Π_r^m is obtained by substituting $\delta_1 = \delta_2 = \delta_m$ in Π_r. However, $\partial(\Pi_r^s - \Pi_r^m)/\partial a_2$ is rather lengthy, and we are not able to show analytically that it is negative. We conducted a numerical analysis by varying a_2, a_s, and θ between 0 and 1, and δ_m is varied between θ and $(1 + \theta)/2$. We find that $\partial(\Pi_r^s - \Pi_r^m)/\partial a_2 < 0$.

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