THE STRATEGIC POSITIONING OF STORE BRANDS
IN RETAILER - MANUFACTURER BARGAINING

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ABSTRACT

We argue in this paper that retailers can strategically position store brands in product space to strengthen their bargaining position when negotiating supply terms with manufacturers of national brands. Using a bargaining framework we model a retailer's decision whether to carry an additional national brand or a store brand, and if the retailer chooses to introduce the latter, where in product space to locate the store brand. Store brands differ from other brands in being both unadvertised and located at a position in product space that is determined by the retailer instead of by a manufacturer. To capture the negotiation effect of store brands empirically, our paper analyses a retailer's choice of whether or not to carry a store brand in a given category. We control for other motivations for carrying a store brand that have been used in the literature. We test our model on a cross-section of categories using supermarket data from multiple retailers. The first contribution of this paper is to show theoretically that the strategic positioning of a store brand in a category changes the bargaining over supply terms between a retailer and national brand manufacturers in that category. The empirical evidence is consistent with the theory. We find that retailers are more likely to carry a store brand in a category if the share of the leading national brand is higher, but that the leading national brand share does not affect the market share of the store brand. This indicates that there may be a bargaining motive for the introduction of the store brand. We propose that this is because the retailer can position the store brand to mimic the leading national brand and present data that shows that store brands frequently imitate national brand packaging on multiple dimensions.

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1 Introduction

Industry observers believe that the balance of power in the grocery channel has shifted in recent years in favor of retailers. Practitioners and academics cite as evidence the growing use of slotting allowances to obtain shelf space (Chu, 1992; Lariviere & Padmanabhan, 1997; Shaffer, 1991), the surge in trade promotions (Gerstner & Hess, 1991; Lal, 1990; Lal, Little, & Villas-Boas, 1996), and the proliferation of store brands ("private labels"). Store brands account for about 14% of total U.S. and 20-30% of European supermarket sales (Quelch & Harding, 1996; Steenkamp & Dekimpe, 1997).

While slotting allowances and trade promotions introduce new mechanisms of monetary transfers between retailers and manufactures they preserve the basic distribution of roles in the channel, namely that manufacturers produce products and retailers sell them. Store brands, however, change the relation between retailers and manufacturers altogether by placing retailers in a dual role as both manufacturers' immediate customers and as their competitors for end-consumers' purchases.

The central idea of this paper is that retailers can strategically position store brands in product space to strengthen their bargaining position when negotiating supply terms with manufacturers of national brands. While there are other motivations for retailers to carry store brands, retailers themselves list bargaining with manufacturers as one of the prime benefits of introducing private labels in a category (from a 1993 PaineWebber retailing conference, see Giblen (1993)). Our own conversations with store brand managers confirmed this finding.[1] We set out to show theoretically and empirically that retailers can strategically use store brands to better negotiate with manufacturers. In contrast, most of the recent empirical literature has focused on the factors that determine the category share of store brands and hence their success in the product market.[2]

Using a bargaining framework, we model a retailer's decision whether to carry an additional national brand or a store brand, and if the retailer chooses to introduce the latter, where in product space to locate the store brand. We show that by positioning the store brand to mimic the leading national brand the retailer can strengthen its bargaining position when negotiating supply terms with the manufacturer of the leading national brand. We show the circumstances under which the retailer benefits from introducing the store brand in terms of the retailer's relative bargaining power vis-a-vis manufacturers and measures of vertical and horizontal differentiation.

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[1] For example, a former high-level marketing executive for the Coca Cola company told us that Coca Cola significantly lowered the wholesale price of its products in response to the introduction and aggressive shelf placement of a premium store brand by a large supermarket chain.

[2] See Dhar and Hoch (1997), Hoch and Banerji (1993) for an example of this work.

Our prediction that retailers may want to design their store brands to imitate a category's leading national brand is confirmed by analyzing the 82 categories that were used in the empirical part of this paper. We visited two stores belonging to the two largest chains in our sample and recorded whether the store brand packaging imitated the packaging of a major national brand, and whether the store brand was displayed next to the imitated national brand. We found that 65% (63%) of all store brands were placed next to a major national brand on the shelf in the stores of chain 1 (chain 2). Further, 20% (15%) of store brands matched the national brand in size, shape, color, lettering *and* art while 59% (52%) matched the national brand in size, shape, and color. Of these imitative store brands between 70 and 80% were placed next to the imitated store brand on the shelf. While imitation would be expected under the bargaining hypothesis considered in this paper, retailers should not want to closely mimic a national brand under the two most commonly held explanations for why retailers carry store brands. Under these two alternative explanations, namely that store brands enable the retailer to price discriminate and to earn higher price-cost margins than with national brands, the retailer will benefit most when revenues are maximized, which should happen when the store brand is differentiated from the national brand. These alternative explanations are considered in section 4.

Empirically, the fact that store brands can both generate revenues for the retailer and serve as a threat in negotiating supply terms with manufacturers introduces a difficulty in assessing the strategic importance of store brands to the retailer. While the revenues a retailer earns from store brands can be easily measured, it is empirically very difficult to determine how store brands affect the supply terms negotiated between a retailer and a manufacturer. A store brand represents a threat to the national brand in that the retailer could promote the store brand through its circulars, advantageous displays, or price promotions, at the expense of national brand sales. However such a threat need not be exercised in order to be effective at extracting profit from the manufacturer, as long as it is a credible threat. As a result, neither the market share of the store brand nor the price differential between national brand and store brand are likely to be monotonically related to the strategic importance of store brands for a retailer.[3] In line with this argument, Narasimhan and Wilcox (1998) have recently shown that the equilibrium market share of a store brand may *decrease* and its price may *increase* even as the store brand is functioning as an effective threat. From this they conclude that an analysis based on store brand prices and market share alone, as has been used in the previous literature that analyzes these two variables cannot easily illuminate the relationship between

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[3]This argument has long been made in industrial organization; for example, it is well known that the threat of entry in an industry can lead to product market behavior by a monopolistic incumbent that is consistent with competition, even if entry does not occur in equilibrium (Baumol, Panzar, & Willig, 1982).

the manufacturer and the retailer.

To capture the negotiation effect of store brands empirically, our paper analyzes instead a retailer's choice of whether or not to carry a store brand in a given category. In doing so we assume that store brands constitute a credible negotiating threat to manufacturers only once they have been introduced, reflecting that retailers may have to incur a substantial fixed cost to introduce a store brand. By examining the decision whether or not to carry a store brand, instead of examining the category share attained by a store brand, our empirics both better capture the strategic importance of store brands in retailer-manufacturer negotiations, and also avoid the endogeneity problems inherent in previous empirical studies in which measures of revenue or market share have been regressed on decision variables such as price differentials and advertising.

We test retailers' use of store brands using recent supermarket data from nine grocery retailers covering about 82 product categories. Our specification examines whether a store brand exists in the category as a function of both category and store characteristics. Our main result is that a retailer's likelihood of carrying a store brand in a particular category increases in the market share of the leading national brand. This evidence is supportive of the bargaining model which will be described in the next section. If we assume that a manufacturer's bargaining power in a category increases with its brand's market share this implies that a store brand's importance for a retailer increases with the relative bargaining power of the leading national brand manufacturer. We exclude alternative explanations that may be driving this result.

To date we know of three papers that have looked at the role of store brands in enabling retailers to strengthen their position vis-a-vis manufacturers. Mills (1995) argues that private labels can allow retailers to capture part of the profit locked away by double marginalization when manufacturers use simple linear pricing. Narasimhan and Wilcox (1998) show that a retailer that is faced with a take-it-or-leave-it offer from a monopolistic manufacturer can retain some surplus by offering a store brand to consumers. This is because, while the store brand offers less utility to consumers, its wholesale price is exogenously determined. In contrast, our model endogenizes all pricing decisions, takes account of the fact that retailers can choose the location of a store brand in product space, and relies on a bargaining framework. Krishnan and Soni (1997) also discuss private label brands as a lever in manufacturer contracting. However, their focus is on investigating when a "guarantee of margins" clause is likely to be accepted by manufacturers. For an excellent discussion of other empirical and theoretical literature in this area see Narasimhan and Wilcox (1998).[4] The result that a firm may undertake strategic actions to better negotiate with suppliers can also be found in related economics literature.

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[4]We refer back in our results to previous empirical findings.

Fontenay and Gans (1999) analyze tapered integration by manufacturers for its bargaining properties vis-a-vis outside suppliers. Similarly, Gans and Stern (2000) show that vertical integration of a portion of a firm's R&D may be sensible because it gives the firm a better position from which to negotiate research contracts.

This paper proceeds as follows. Section 2 discusses brands and consumer heterogeneity. Section 3 shows that by positioning the store brand to mimic the leading national brand the retailer can strengthen its bargaining position. Section 4 discusses other motivations for why a retailer may want to carry store brands. Section 5 introduces the empirical strategy used in this paper. Section 6 presents the empirical results, and section 7 concludes the paper.

2 Brands and consumers

To empirically examine why retailers may want to introduce store brands, it helps to understand the distinction between store brands and other brands as well as why consumers may have preferences for certain types of brands.

2.1 Brand types

We distinguish between two types of brands typically found in the grocery industry. First, the brands of major manufacturers are generally referred to as "national brands." These brands are supported by manufacturer advertising through mass media and are typically sold and advertised across the US. Examples are "Tide," "Diet Coke," "Tostitos," "Kleenex," and "Tropicana."

Second, we refer to "store brands" as brands that consumers associate with a retail chain either because the brand name includes the retailer's name (such as "Safeway Select") or because the brand is sold only at that retail chain. The crucial feature of a store brand in this paper is that the retailer can choose the position of the brand in product space. That is, the retailer can decide on the packaging and contents of the store brand (and can choose to closely mimic a national brand, if desired.) Store brands are not advertised by retailers through mass media, although retailers do highlight store brands in flyers and through in-store merchandising. Retailers can carry more than one store brand in a category, for example, Safeway may sell both corn flakes and bran cereal under the "Safeway Select" label. Alternatively, a retailer may offer two store brands that differ in quality, for example, Star Market sells canned vegetables under both its "Star" and "President's Choice" brands. The latter is sometimes referred to as a "premium" store brand.[5]

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[5] "President's Choice" is a store brand that is of great interest to researchers because it is carried exclusively

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In most categories there are obviously more products than those that fit our definition of national or store brand. We will refer to these as the "competitive fringe." The fringe may function as a supply of potential contract producers for store brands, possibly allowing a retailer to extract all rents from the store brand. Additionally, the fringe contains brands without significant amounts of national or regional advertising, but which could be placed on the shelf if the retailer needed to create more differentiation in the category. For example, in the San Francisco Bay area Safeway carries "Padrinos" tortilla chips and "Rock Island" eggs (based in Oakland and Petaluma respectively).[6] We will not discuss the competitive fringe further, except to remind the reader that those brands - and competition among them - may create an outside supply option for the retailer.

Research into consumers' perceptions of brands suggests that brands fulfill at least two important functions that are important in distinguishing between national and store brands (Erdem et al., 1998). First, consumers may derive utility from the associations that advertising creates with the brand name. For example, it is well established that the utility that consumers derive from smoking "Marlboro" cigarettes stems in part from the brand association with cowboy ideals. Marketing scholars have shown experimentally that consumers may derive utility from the branded product that exceeds the utility they would derive from an identical but unbranded product (Aaker, 1991; Keller, 1998).[7] National brands are supported by the type of mass media advertising necessary to create these additional consumption benefits, but store brands are not. Except for some utility associated with advertising for the store as a whole, store brands are therefore unlikely to provide consumers with any utility above and beyond that derived from the physical product.[8]

The second function typically performed by brands is that the brand name may reduce consumers' perceived risk of consuming the product. Since establishing a national brand re-

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by one supermarket in a region and its products are as high quality as national brand products. Our model, however, is not designed to reflect this type of store brand strategy. President's Choice is so good that adding it to the category is just like adding anther national brand. The key characteristic of store brands we exploit in our model is that the retailer can position the store brand exactly where it wants it in product space. This is not true of President's Choice.

[6] Occasionally, regional brands are strongly advertised. For the purposes of our distinction they share more similarities with national than fringe brands, hence we will subsume them under national brands. Examples in the San Francisco Bay area include "Berkeley Farms" dairy products and "Semifreddi's" bakery products.

[7] In a famous marketing campaign in the 1980's Pepsi introduced the "Pepsi Challenge" to expose the fact that consumers preferred Coke to Pepsi when they knew which product they were testing but preferred Pepsi to Coke in a blind taste test.

[8] We offer two explanations store brands are not advertised through mass-media. First, it may be that the store brand name – or any brand name that is used across many unrelated product categories – is ill suited to serve as an anchor for category specific associations created through advertising. Second, since store brands are only sold in one retailer's stores whereas national brands are typically sold across many retailers, advertising by national brand manufacturers may be much more efficient.

quires a substantial, up-front fixed cost in the form of advertising, this expenditure serves as a signal that the product is of a minimum quality. If the product were not of sufficient quality, so the argument goes, the firm would not be able to recover the fixed cost of advertising to establish and support the brand name (see Tirole (1988), pp. 118-119 for a discussion). By this argument only national brands should reduce consumers' perceived risk of consumption compared to unadvertised products. However, store brands can rely on a different mechanism to guarantee quality, usually referred to in the literature as "umbrella branding" (Montgomery & Wernerfelt, 1992; Wernerfelt, 1988). The argument here is that by using the same brand name across many different products (in this case the name of the store across different categories), a retailer can put its reputation in many product categories at risk if it provides poor quality in only one category. This increases the "punishment" that would follow a deviation to poor quality and thus reduces consumers' perceived risk of consuming the store brand. Note that fringe brands can rely on neither advertising nor umbrella branding to guarantee quality and should thus be perceived by consumers to pose a greater risk at the time of consumption. Table 1 summarizes our discussion of the differences between brand types.

Brand Type	Positioning controlled by retailer?	Creates utility through advertising association?	Reduces perceived risk of consumption?
National	No	Yes	Yes
Store	Yes	No	Some

Table 1: Attributes of national and store brands

2.2 Consumer heterogeneity

The large variety of products offered in most categories indicates that consumers of grocery retailers are heterogeneous in tastes and preference for quality. In addition, there is evidence that consumers differ along at least two of the dimensions that differentiate national and store brands. First, consumers vary in the utility that they derive from the brand associations created through advertising. For example, sports stars and fashion images appeal differently to different consumers.

Second, consumers vary in their aversion to unintentionally consuming a low quality product (see Hawkins, Best, and Coney, Ch. 16). For example, a parent purchasing orange juice for his small child may be more reluctant to purchase an unknown brand of orange juice if he is concerned that it may have come from oranges heavily treated with pesticides. The degree to which consumers are averse to an adverse consumption experience is likely to vary by product category. For example, since the quality of a pain killer is hard to detect prior to consumption

and the consequences of consuming a bad quality analgesic can range from unpleasant to dangerous, we expect that most people will be very risk averse with regards to analgesics.[9] In contrast, we expect that consumers will not be risk averse with regards to bathroom tissue, for example.

3   Store brand positioning as a retailer bargaining tool

In this section we develop a model that shows that retailers can use store brands to improve their negotiating position vis-a-vis manufacturers. In recent years negotiating over supply terms has become standard practice between retailers and manufacturers. Firms such as Walmart and Krogers have used their power to pressure manufacturers into granting price concessions (Stern, El-Ansary, & Coughlan, 1996) over both marginal payments (e.g., wholesale prices) and over non-marginal payments (e.g, slotting allowances, cooperative advertising). Manufacturers can no longer simply dictate their terms of sale.

The vertical relations literature has proposed an intuitive solution to a bargaining game between multiple parties that describes a situation in which manufacturers sell through a common retailer. Most recently, Shaffer and Zettelmeyer (1999) derive an equilibrium to a bargaining game between two manufacturers and a retailer that is useful for understanding the role of store brands in manufacturer-retailer negotiations.[10]

The game consists of two stages. In the first stage, the retailer negotiates contract terms with each manufacturer, X and Y. In the second stage, the retailer chooses how much to buy of products X and Y, and then resells these quantities to consumers. There are two bargaining assumptions made. The first assumption is that bargaining between the retailer and firm i results in maximization of the two players' joint profit, taking as given the retailer's contract with firm j, $j \neq i$. The second is that each firm earns its disagreement payoff plus a share of the incremental gains from trade.[11]

Shaffer and Zettelmeyer (1999) show that there exists a unique equilibrium allocation of channel profits in the bargaining game. If π_x^*, π_y^*, and π_r^* denote the equilibrium profits of firm

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[9]The share of brand name sales of over-the-counter pain relievers is very large despite a price premium over generic products.

[10]Iyer and Villas-Boas (1998) also consider bargaining in a distribution channel by modelling a bilateral monopoly between a single manufacturer and retailer. We cannot apply their model to our problem since our argument relies on the externalities which are present when manufacturers compete in a common channel.

[11]The assumptions are consistent with the commonly used bargaining solutions (e.g., Nash bargaining, Rubinstein alternating offers bargaining, egalitarian bargaining, and Kalai-Smorodinsky bargaining) and with the contract equilibrium concept of Cremer and Riordan (1987) and O'Brien and Shaffer (1992), and the pairwise-proof equilibrium in McAfee and Schwartz (1994).

X, firm Y, and the retailer, then,

$$\pi_x^* = \lambda_x \left(\Pi_{x,y} - \Pi_y \right) \tag{1}$$

$$\pi_y^* = \lambda_y \left(\Pi_{x,y} - \Pi_x \right) \tag{2}$$

$$\pi_r^* = \Pi_{x,y} - \pi_x^* - \pi_y^*, \tag{3}$$

where $\Pi_{x,y}$ is the maximized profit that can be earned in the channel if both products are sold to consumers (the "total channel profit"), and Π_x (Π_y) is the maximized profit that can be earned in the channel if only product X (Y) is sold (the "monopoly profit of the retailer and firm X (Y)"). The result implies that, in equilibrium, $\Pi_{x,y}$ is the total profit to be divided among the channel members, and that firm i earns proportion λ_i (representing its bargaining power) of the the incremental profit contributed by its product. The incremental profit is the difference between the total channel profit and the monopoly profit of the retailer and its rival.[12] Intuitively, each manufacturer captures what is unique about its product, or something proportional to that, depending on the manufacturer's bargaining power. If the manufacturers' products are perfect substitutes, each manufacturer earns zero and the retailer can appropriate the total channel profits. As the products become more differentiated (less substitutable), each manufacturer's profit increases and the retailer's profit decreases.

To argue why retailers may want to introduce store brands we can use the simple insight that each manufacturer can obtain as a payment from the retailer (at most) its incremental contribution to total channel profits. We propose that the retailer can use a store brand to decrease the incremental contribution of a national brand and thus improve its supply terms with the national brand manufacturer. As shown in the introduction, we frequently observe that store brands closely copy the package design of the leading national brand in the category, suggesting to consumers that the store brand is a close substitute to the national brand. The incremental contribution of the national brand decreases with an increase in the perceived substitutability between the national brand and the store brand because if the manufacturer of the national brand were to stop supplying its product, the loss in profits for a retailer that carries a close substitute is comparatively small. This allows the retailer to extract profits from the national brand manufacturer if it carries an imitation.[13]

We can illustrate this point with a simple model. Suppose that brands can be "positioned"

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[12]This insight can easily be extended to more than two products.

[13]This point distinguishes our paper from Raju, Sethuraman, and Dhar (1995) who also discuss positioning the store brand as a close substitute to the national brand. In our model the *reason* the retailer would want to make this choice is to extract channel profits from the manufacturer. Their model does not have this motivation because there the retailer does not internalize pricing decisions of the national brands.

to satisfy the tastes of one of two consumer segments, 1 and 2 with mass α and $1-\alpha$, respectively. A consumer in segment 1 that consumes a brand positioned for segment 2 enjoys only a fraction $\tau \in (0,1)$ of the utility she would have enjoyed if she had consumed a brand positioned in segment 1 and vice versa. In addition, brands can either be advertised or not where the cost of advertising is assumed to be fixed, $F_a > 0$. We refer to advertised brands as national brands and unadvertised brands as store brands. A consumer who consumes a store (unadvertised) brand derives only a fraction $s \in (0,1)$ of the utility she would from a consuming national (advertised) brand in the same position. One may think of s as the degree to which a store brand's perceived quality approaches the national brand and τ as the degree to which a product that was positioned for one segment is perceived by consumers as a good substitute for a product that was positioned in the other segment. We assume that consumers do not all value advertising the same; a consumer of type θ that consumes a product positioned in her own segment has utility θ for a national brand and utility $s\,\theta$ for a store brand where θ is distributed uniformly in $[0,1]$. Following the definition of segments, the same consumer would have utility $\tau\,\theta$ for a national brand in the other segment, and utility $\tau\,s\,\theta$ for a store brand in the other segment. Finally, we assume zero marginal cost of production, implying that there is no difference in the marginal cost of producing a national and a store brand.

We introduce the following notation: $\Pi_{i,j}^{k,h}$ is the maximum profit that can be earned in the channel in total if i's product is in segment k and j's product is in segment h. The capital letter notation represents the profit of a vertically and horizontally integrated monopolist that manufactures and sells all products. The maximum profit the retailer can earn is $\pi_r^{*}{\binom{k,h}{i,j}}$ (where $i,j \in \{x,y,s\}$, $k,h \in \{1,2\}$). Subscripts x and y refer to manufacturers X and Y, respectively, and subscript s refers to the store brand manufacturer. Analogously, Π_i^k is the maximized profit that can be earned in the channel if firm i positions its product in segment k and only this product is sold by a fully integrated monopolist.

The retailer's problem is as follows: he is currently carrying a national brand from manufacturer X that is positioned for the larger of the two consumer segments which we will define to be segment 1 ($\alpha \in (1/2,1]$). We will refer to this brand as the "leading national brand." The retailer has shelf space for exactly two brands. He needs to decide which brand to add, a second national brand or a store brand. We assume that national brand manufacturer Y chooses the positioning of the second national brand and the retailer chooses the positioning of the store brand.[14]

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[14]Here the existence of the competitive fringe is important for understanding our choice of the retailer's problem. Notice that in the absence of technological barriers to entry there is no shortage of differentiated brands for the retailer to place on the shelf. If a category with a limited number of national brands would be more profitable with another differentiated product, the retailer has many products to choose from. In contrast to the previous literature, the retailer does not need to introduce a *store* brand solely to get another product on

Before proceeding with the presentation of the model, it is important to note that, while we believe that retailers carry store brands for multiple reasons, this model rules out other retailer incentives to carry store brands in order to clearly identify the bargaining motivation. These alternative reasons will be discussed in section 4 and in the empirical work. In particular, in the model all consumers prefer national brands to store brands, demands are linear and production has zero marginal cost, which implies that store brands do *not* serve to price discriminate within each consumer segment. The per unit profits the retailer realizes from selling the national brand is high enough that he has no incentive to try to attract consumers to the store brand instead. Formally, for each consumer segment, a fully integrated monopolist does not benefit from introducing a store brand at the same position in product space as an existing national brand; total channel profits are unchanged.

Lemma 1

$$\Pi_{x,s}^{1,1} = \Pi_x^1 \tag{4}$$

$$\Pi_{y,s}^{2,2} = \Pi_y^2 \tag{5}$$

Proof: *Immediate from profit expressions in the Appendix.*

To exclude a further explanation why a retailer may want to introduce a store brand, we assume that the manufacturer of the store brand has the same bargaining power as the national brand manufacturers ($\lambda_x = \lambda_y = \lambda_s \equiv \lambda$).[15] This biases our results against a retailer's incentive to carry a store brand and thus illuminates the bargaining motivation.

We now show that whether the retailer prefers to carry a second national brand or a store brand depends on the bargaining power of the manufacturers. For now we assume that the retailer would position a store brand in segment 1, and manufacturer Y would position a second national brand in segment 2 (we will show later that these assumptions in fact hold). We can now state the main proposition:

Proposition 1 *Suppose that the incremental contribution of the leading national brand to total channel profits is lower when the retailer carries a store brand than when the retailer carries a second national brand: $\Pi_{x,s}^{1,1} - \Pi_s^1 < \Pi_{x,y}^{1,2} - \Pi_y^2$*

the shelf. Hence, our key concern is not whether the retailer should introduce an additional brand, instead we ask which type of additional brand the retailer should want to carry.

[15]An interpretation of this is that the store brand is not "cheaper to acquire" than a national brand. It might be more realistic for many product categories to assume that the manufacturer of the store brand has little or no bargaining power ($\lambda_s = 0$), an assumption we would make if the market for store brands were competitive. For example, in the absence of technological barriers one might think of the industry represented by the fringe brands as a market in which the retailer can contract for a store brand. Because there is competition between the many existing and potential fringe brands in the market, there is no economic rent to be earned from providing the store brand. The main results do not differ between the two cases. We highlight below a change in one of the minor conclusions.

Then, there exists a $\bar{\lambda} \in (0,1)$ such that for all $\lambda > \bar{\lambda}$ the retailer prefers to introduce a store brand to a second national brand.

Proof: *Let $\lambda = 1$. It follows that $\pi_r^*(\frac{1,1}{x,s}) > \pi_r^*(\frac{1,2}{x,y}) \Leftrightarrow \Pi_{x,s}^{1,1} - \Pi_s^1 < \Pi_{x,y}^{1,2} - \Pi_y^2$ which holds by assumption. Let $\lambda = 0$. Using Lemma 1 we can write $\pi_r^*(\frac{1,2}{x,y}) > \pi_r^*(\frac{1,1}{x,s}) \Leftrightarrow \Pi_{x,y}^{1,2} > \Pi_{x,s}^{1,1} = \Pi_x^1$ which holds by Lemma 2 in the appendix. Then by continuity of $\pi_r^*(\frac{1,1}{x,s}) - \pi_r^*(\frac{1,2}{x,y})$ there exists a $\bar{\lambda} \in (0,1)$ such that for all $\lambda > \bar{\lambda}$, $\pi_r^*(\frac{1,1}{x,s}) > \pi_r^*(\frac{1,2}{x,y})$. Q.E.D.*

Intuitively, the proposition says that if the store brand is a closer substitute than the second national brand to the leading national brand, then when manufacturer bargaining power is high, the retailer will want to introduce the store brand. Carrying the store brand will most reduce the manufacturer's incremental contribution, counteracting high manufacturer bargaining power. Although total channel profits would always be higher if the retailer were to offer two national brands instead of one store and one national brand, when manufacturer bargaining power is high, the retailer would not be able to retain a large share of that increased surplus.[16] If manufacturer bargaining power is very low, then the retailer will be able to collect most of the profits from the channel and will introduce the other national brand. Note that the introduction of a store brand increases the retailer's profits through a pure redistribution of channel profits, not through a price discrimination effect.

It is easy to find examples in the parameter space $(\alpha,\ \tau,\ s)$ for which the incremental contribution of the leading national brand to total channel profits is lower when the retailer carries a store brand than when the retailer carries a second national brand. For example, this is the case for all $(\alpha,\ \tau,\ s) \in \Omega$ where $\Omega = \{\alpha,\ \tau,\ s \mid 0 \le \tau < \frac{1-\alpha}{2-\alpha},\ 0 < s \le 1,\ 1/2 < \alpha \le 1\}$.[17] In general, the less differentiated the two national brands are (higher τ), the higher quality a store brand must be (higher s) in order for a retailer with low bargaining power to prefer to carry it.[18]

Note that dropping the national brand from the shelf is a very strong threat. To make the argument somewhat less dramatic and perhaps more realistic, we can instead let the retailer threaten to aggressively promote its mimicking store brand at the expense of the national brand, rather than drop the national brand.[19] This situation is still consistent with the argument above; in both cases the retailer has improved its disagreement payoff. When it carries a store brand that is an imitation of the national brand, the retailer has better profit opportunities in cases when negotiations do not lead to a beneficial agreement to promote the national brand.

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[16]For a discussion of efficiency see page 15.

[17]See the appendix for a proof.

[18]This describes the case for $\tau \ge \frac{1-\alpha}{2-\alpha}$.

[19]One executive we spoke to indicated that his chain did drop national brands from the shelf for a few days when negotiations went particularly badly.

As noted in the introduction, an important underlying assumption in this argument is that the *existence on the shelf* of the store brand is what makes the retailer's threat credible. While the retailer can threaten to obtain and market a store brand in the future, we claim that this type of threat is not as powerful, and will have less impact on the manufacturer's behavior, than when the store brand already exists. This is because the retailer must pay a fixed cost and endure some delay before the store brand appears on the shelf. If it were effective, the retailer would like to threaten to carry store brands, but never actually do so. Already having a store brand is the credible commitment that changes the bargaining game.

The immediate question following this argument is why a retailer cannot introduce a second national brand that is a very close substitute to the target national brand. Since there is always an element of vertical differentiation between a national and a store brand (due to the difference in advertising), one might think that a second national brand could potentially be a much better substitute for the targeted national brand, allowing the retailer to improve its supply terms even further. To understand why this is unlikely to occur it is helpful to revisit one of the fundamental differences between national brands and store brands, namely, that the location in product space of a national brand is controlled by its manufacturer while the location in product space of a store brand is controlled by the retailer. While the retailer should want to introduce a close substitute to the target national brand, the manufacturer of the second national brand is less inclined to position its product as a close substitute to the target national brand. This is captured in the following proposition:

Proposition 2 *Firm Y will not position its brand in segment 1.*
Proof: *Suppose firm Y did position its brand in segment 1. From (2) we know that $\pi_y^* = \lambda_y \left(\Pi_{x,y}^{1,1} - \Pi_x^1 \right)$. Since consumers derive the same utility from X and Y, $\Pi_{x,y}^{1,1} = \Pi_x^1$ Hence, $\pi_y^* = 0 < F_a$ and firm Y is better off not offering its national brand. Q.E.D.*

Intuitively, if Firm Y positions its product in the same segment as the existing leading national brand, its incremental contribution, and therefore its profits are zero; in other words, there are no economic rents in producing homogeneous products. As a result, the manufacturer of a national brand has little incentive to produce a close substitute to another national brand. Thus, the very condition that makes another national brand in segment 1 useful to the retailer, namely that it makes Firm X's incremental contribution zero, also makes Firm Y not want to introduce its brand in segment 1 because *its* incremental contribution will also be zero.

Alternatively, one might ask whether the retailer might prefer to introduce the store brand in segment 2:

Proposition 3 *The retailer will not position the store brand in segment 2.*

Proof: *Suppose the retailer did position its store brand in segment 2. Using (3) we know* $\pi_r^*(\begin{smallmatrix}1,2\\x,s\end{smallmatrix}) = \Pi_{x,s}^{1,2} - \lambda(\Pi_{x,s}^{1,2} - \Pi_s^2) - \lambda(\Pi_{x,s}^{1,2} - \Pi_x^1)$. *If the retailer were to introduce its store brand in segment 1 or introduce the second national brand (which by Proposition 2 is only offered in segment 2) its profits would be* $\pi_r^*(\begin{smallmatrix}1,1\\x,s\end{smallmatrix}) = \Pi_{x,s}^{1,1} - \lambda(\Pi_{x,s}^{1,1} - \Pi_s^1) - \lambda(\Pi_{x,s}^{1,1} - \Pi_x^1)$ *and* $\pi_r^*(\begin{smallmatrix}1,2\\x,y\end{smallmatrix}) = \Pi_{x,y}^{1,2} - \lambda(\Pi_{x,y}^{1,2} - \Pi_y^2) - \lambda(\Pi_{x,y}^{1,2} - \Pi_x^1)$, *respectively. Simple algebraic manipulation using Lemma 1 shows that for* $\Pi_s^1 > \Pi_s^2$ *and* $\Pi_y^2 > \Pi_s^2$, $\pi_r^*(\begin{smallmatrix}1,1\\x,s\end{smallmatrix}) > \pi_r^*(\begin{smallmatrix}1,2\\x,s\end{smallmatrix})$ *iff* $\lambda > 1/2$ *and* $\pi_r^*(\begin{smallmatrix}1,2\\x,y\end{smallmatrix}) > \pi_r^*(\begin{smallmatrix}1,2\\x,s\end{smallmatrix})$ *iff* $\lambda < 1/2$. $\Pi_s^1 > \Pi_s^2$ *and* $\Pi_y^2 > \Pi_s^2$ *hold by Lemma 2 in the appendix. Q.E.D.*

The intuition for this result is as follows. When manufacturers have less than half of the bargaining power ($\lambda < 1/2$), the retailer benefits (ceteris paribus) from an increase in total channel profit. To see this, consider the retailer's profit when offering two national brands:

$$\pi_r^*(\begin{smallmatrix}1,2\\x,y\end{smallmatrix}) \quad = \quad \Pi_{x,y}^{1,2} - \lambda(\Pi_{x,y}^{1,2} - \Pi_y^2) - \lambda(\Pi_{x,y}^{1,2} - \Pi_x^1) \tag{6}$$

$$= \quad \lambda\Pi_x^1 + \lambda\Pi_y^2 + (1 - 2\lambda)\Pi_{x,y}^{1,2} \tag{7}$$

Given that a store brand located at segment 2 increases total channel profits less than the second national brand *and* is not "cheaper to acquire" ($\lambda_y = \lambda_s$), the retailer prefers the national brand.[20] When each manufacturer has more than half of the bargaining power ($\lambda > 1/2$), the retailer benefits (ceteris paribus) from a decrease in total channel profit since this decreases the sum of both manufacturers' incremental contribution by more than total channel profits. Given that a store brand located at segment 1 does not increase total channel profits but lessens the incremental contribution of firm X, the retailer prefers to position the store brand at segment 1.

Finally, one might ask why the retailer could not introduce one of the fringe brands as a close substitute to the national brand. The same argument as for the national brand applies. The better the fringe brand substitutes for the national brand, the lower the incremental contribution that the manufacturer of the fringe brand can appropriate. Since economic profits are earned through differentiation, it is only in the retailer's interest, not in any manufacturer's, to have an almost exact imitation of an existing product on the shelf. In addition, the fringe brand will be a less good substitute than a store brand due to difference in the degree to which the brands can guarantee quality.

How much the retailer can gain by an improved negotiating position depends on the extent to which store brands can lower the incremental contribution of the national brands. In line

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[20]Note that the result in this proposition need not hold if we assume that the store brand manufacturer has no bargaining power ($\lambda_s = 0$). This is because while the store brand increases total channel profits less than the second national brand, its costs to the retailer are lower. One can show that for intermediate λ (of manufacturers X and Y), the retailer may be best off introducing the store brand in segment 2. However, the result remains that for large λ the retailer prefers to introduce the store brand in segment 1.

with the model formulation we focus on the leading national brand:

Proposition 4 *Suppose the retailer prefers introducing a store brand to a second national brand. Then, the higher the manufacturers' bargaining power (λ) and the larger the segment of consumers that favor the leading national brand (α), the more the retailer benefits from introducing a store brand.*

Proof: *Applying the assumption that each manufacturer earns its disagreement payoff plus a share λ of the incremental gains from trade to bilateral bargaining between the retailer and manufacturer X, the retailer's gain from carrying a store brand in addition to the leading national brand is $\Delta\pi_r^* = \pi_r^*(^{1,1}_{x,s}) - (1-\lambda)\Pi_x^1$. Using Lemma 1, $\Delta\pi_r^* = \lambda\Pi_s^1$. Hence, $\frac{\partial\Delta\pi_r^*}{\partial\lambda} = \Pi_s^1 > 0$. From Lemma 2 we know that $\frac{\partial\Delta\pi_r^*}{\partial\alpha} = \lambda\frac{\partial\Pi_s^1}{\partial\alpha} > 0$. Q.E.D.*

Intuitively, the retailer will benefit most from introducing a store brand when total profits from selling the leading national brand is high (large α) and when Firm X captures a large share of those profits (large λ). Considering that in this model of discrete segments, α proxies for market share of the leading national brand we hypothesize that in the empirical analysis, all else equal, the larger the category share of the leading national brand, the more likely will be a retailer to carry a store brand.

Efficiency in product choice

This model predicts that the retailer may want to introduce a store brand even if doing so decreases total channel profits. This implies that the product choice of the retailer can be inefficient. This inefficiency disappears if we think of the bargaining game as the second stage of a game in which manufacturers first contract for shelf placement with the retailer. If manufacturers can make make side payments in the first stage in exchange for binding contracts that guarantee shelf placement of their products, in equilibrium the retailer will always carry and promote the products that maximize total channel profits.[21]

The expanded game underlines an argument we have made in the introduction, namely that the market share of the store brand is a poor indicator for the strategic importance of the store brand for the retailer. To make this argument, suppose that there are cases in which carrying the store brand may lead to higher total channel profits than carrying the second national brand.[22] Now suppose that manufacturers have all the bargaining power ($\lambda_x = \lambda_y = \lambda_s = 1$) and that the retailer needed to decide whether to carry a store brand in segment 1 or a second

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[21]We would like to thank Birger Wernerfelt for raising this point.

[22]This means that the store brand *may* serve to price discriminate within each consumer segment – a motivation we explicitly excluded in deriving the bargaining motivation in order not to confound it with a possible price discrimination motivation (see section 4.1).

national brand. In the absence of shelf placement contracts the retailer will carry the store brand instead of the second national brand iff

$$\Pi_{x,s}^{1,1} - \Pi_s^1 < \Pi_{x,y}^{1,2} - \Pi_y^2. \tag{8}$$

In the expanded game we have argued that the retailer will carry the store brand instead of the second national brand iff

$$\Pi_{x,s}^{1,1} > \Pi_{x,y}^{1,2}. \tag{9}$$

If (8) and (9) hold, the expanded game predicts that the retailer will carry the store brand in equilibrium *and* benefit from the (exercised) threat to carry a store brand. In fact, store brands are the market share leader in about 20% of categories.[23] If (8) holds but (9) does not, the retailer will carry both national brands, but only because one or both national brand manufacturers will compensate the retailer in the first stage to make up for the fact that in the second stage the retailer is worse off carrying the second national brand instead of the store brand. The expanded game predicts in this case that the retailer will *not* generate revenues from the store brand in equilibrium but *nonetheless benefits* from the (now unexercised) threat.

For the empirical analysis our predictions as to when we should observe the retailer carrying store brands continue to hold in the expanded game, since we have argued that the on-the-shelf existence of the store brand is what makes the retailer's threat credible. Hence, if the retailer prefers to carry a store brand, but category profits increase more as a result of introducing another national brand, we expect the retailer to be compensated by national brand manufacturer(s) for carrying and promoting that national brand. The store brand will nonetheless be introduced to serve as a credible threat but might be relegated to a shelf near the floor and priced relatively high.[24]

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[23]We would like to thank Sanjay Dhar for pointing this out to us.

[24]The managers we spoke with claimed that there were no explicit contracts of the type "the retailer will not carry (promote) a store brand in return for good supply terms from the national brand." The reason might be that the manufacturer-retailer relationship is characterized by repeated interaction in a long-term relationship where negotiations are frequent due to changes in demand, cost, product range, promotions, market structure, etc. In this setting one might expect that cooperative agreements can be sustained without formal contracts. In the supermarket, it is easy for one party to see if the other is behaving in a manner that is inconsistent with an informal understanding, and supply terms can be renegotiated. For example, a retailer could lower the price of its store brand, place it on the shelf next to the national brand, and add a large "compare and save" sign to the shelf. This type of action might cause a national brand to alter co-promotional agreements with the retailer or to change its pricing structure.

4 Other retailer incentives to carry store brands

The focus of this paper is to introduce theoretically and empirically the imitative use of store brands as a bargaining tool for retailers. Indeed, the model we have presented so far has been explicitly constructed to be driven solely by the bargaining motivation. However, as we move to the empirical results, it will be important to keep in mind – empirically control for – other motivations for retailers to carry store brands. We therefore discuss briefly three other such motivations.

4.1 Store brands allow the retailer to price discriminate between consumers

Differences among consumers in the utility that they derive from the brand associations created through advertising and in their aversion to unintentionally consuming a low quality product can be exploited by retailers to second degree price discriminate among consumers through national, store, and fringe brands. Such discrimination may increase total channel profits, even if there are no cost differences to the retailer in selling the three types of brands. Consumers that derive high utility from the brand associations created through advertising should self select into national brands. Consumers that derive low utility from these brand associations but have a strong aversion to unintentionally consuming a low quality product, should self select into store brands. Consumers that care neither about brand associations from advertising nor are very risk averse should purchase a brand from the competitive fringe. Thus the assortment of brands that best price discriminates among consumers (and therefore maximizes total channel profits) is likely to differ with the distribution of consumer types.

This does not mean that the retailer is most likely to introduce a store brand when doing so most effectively price discriminates. This is because whether a retailer benefits from an increase in total channel profits depends on its bargaining power vis-a-vis manufacturers. To see this, suppose that, in contrast to the model in section 3, the store brand *did* serve to price discriminate, i.e. that total channel profits from selling the store brand and the national brand in segment 1 exceeded the profits from selling only the national brand, $\Pi_{x,s}^{1,1} > \Pi_x^1$. All else equal, the better the store brand is at price discriminating, the higher are total channel profits $\Pi_{x,s}^{1,1}$. Now consider the retailer's profits when carrying the leading national brand and the store brand in segment 1:

$$\pi_r^*\binom{1,s}{x,y} = \lambda_x \Pi_x^1 + \lambda_s \Pi_s^1 + (1 - \lambda_x - \lambda_s)\Pi_{x,s}^{1,1} \tag{10}$$

Notice that whether the retailer benefits from an increase in total channel profits depends on the bargaining power of the store brand (λ_s) and the leading national brand (λ_x). For

example, suppose the store brand manufacturer had no bargaining power ($\lambda_s = 0$). Then the retailer benefits if the store brand better price discriminates because she can appropriate a part of the increase in total channel profits. If the store brand manufacturer had as much bargaining power as the national brand ($\lambda_s = \lambda_x$) and λ_x were greater than 1/2, the manufacturers could appropriate more than the full amount of any increased ability by the store brand to price discriminate and the retailer would consequently be worse off.

Thus, if a retailer has shelf space constraints and/or incurs fixed cost by introducing an additional brand, the incentive of a retailer to carry store brands is likely to be a function of both the distribution of consumer types *and* manufacturers' bargaining power. For the empirical analysis we conjecture that in most product categories the manufacturers of store brands have little bargaining power. This captures a situation in which the market for store brands is quite competitive (see footnote 15 for a discussion).

Based on these arguments we expect to find that, all else equal, a retailer is less likely to carry the store brand in a product category in which more consumers derive some utility from the brand associations created through advertising. For example, we expect that a retailer is less likely to carry a store brand in the cigarette category than in the sugar category.

With respect to risk aversion we expect to find that, all else equal, a retailer is more likely to carry a store brand in a product category in which more consumers are only moderately averse to unintentionally consuming a low quality product. For example, a retailer could be less likely to carry store brands in the infant formula category because the store name is an insufficient guarantee of quality to consumers. On the other hand, the quality certification provided by the store's name might make it worth carrying a store brand in the analgesics category as compared to the bathroom tissue category, where consumers may be more willing to purchase an unknown brand.

4.2 The retailer can take advantage of the marginal – average cost gap

The advertising required to support national brands implies that national brand manufacturers have average costs that are substantially higher than their marginal costs of production. Since in the long run manufacturers will not supply their products below average cost, the gap between marginal and average cost of national brand manufacturers allows retailers to achieve higher per unit profits selling a store brand than selling a national brand with similar marginal costs of production. Industry observers, the popular press, and academic work all indicate that this effect can be quite large (Hoch & Banerji, 1993). However, it is important to remember that manufacturers often provide services to the retailer (inventory, promotions, shelf-stocking, etc.) for "free." As noted in Corstjens and Lal (2000) the retailer has to perform and pay

for these services in the case of its own store brand, a fact which should not be omitted when calculating profitability of each type.

We have argued in the previous subsection that a retailer may want to use a store brand to price discriminate between heterogeneous consumers. In other words, depending on the distribution of consumer tastes, the retailer will want to set prices that induce some consumers to self-select into each type of brand. If retailer price-cost margins are higher on store brands than on national brands, the retailer may have an additional incentive to carry a store brand beyond the price discrimination and bargaining incentive.

One might argue that since a fringe product is also not saddled with high average costs due to advertising, a retailer could just as well increase its price-cost margin by selling an attractively priced fringe brand. However, a store brand may be more highly valued by consumers that are averse to unexpectedly consuming low quality. Hence, a store brand is more suitable as a means of attracting some consumers that would purchase a national brand in the absence of an unadvertised alternative.

Despite the attraction of higher price-cost margins, a retailer should not aim to completely substitute store brands for national brands since the retailer depends on national brands to serve consumers that derive utility from the brand associations created by advertising. In addition, one can argue that in certain product categories only national brands can effectively communicate a location in product space (by advertising), a location that store brands frequently imitate.

Since the price-cost margin that a retailer can achieve from selling a store brand is related to the marginal – average cost differential of national brand manufacturers, we expect to find that, all else equal, the larger the fixed cost associated with supporting a national brand, the more likely a retailer is to carry a store brand.

4.3   Economies of Scale

Conditional on the retailer having an incentive to use store brands to increase its profits (through an improved negotiating position, price discrimination, and higher retailer price-cost margins), the fixed cost associated with introducing a store brand means that a retailer is more likely to want to do so if the absolute size of the potential gains from the store brand are larger. We therefore expect to find that, all else equal, the larger the revenues in a category, the more likely is a retailer to carry a store brand.

5 Empirical Strategy

Relationships between retailers and manufacturers in the supermarket industry are very complex. In addition to a wholesale price that may be a function of volume, there are promotions, co-promotions, inventory services, shelf-stocking services, and slotting fees that transfer resources back and forth between the two parties. Data on the monetary flows in these relationships are extremely hard to find, and are almost useless to a researcher unless they are complete. Thus when we empirically implement our hypothesis, we will not focus on one measure such as the wholesale-retail margin to summarize the surplus accruing to each party.[25] Although we would prefer to measure the overall profitability of a category and relate that to the adoption of a store brand, we cannot use this approach because of the complexity of measuring profitability. Instead we will analyze the simple dichotomous choice of whether the retailer carries the store brand or not. We assume that in making that choice, the retailer is acting to maximize its own profits, and therefore categories with store brands are more profitable than they would have been without those brands.

The empirical model assumes that there is some net profit associated with introducing a store brand into a category. This profit depends on the incremental benefits and costs of supplying the store brand. When the net benefit is sufficiently high, the researcher observes the dichotomous choice "enter." Otherwise, there is no store brand in the category. Because of the observed discrete choice, we will use a probit functional form. The benefits included in our model will be demand measures such as demographics, category size (because of the fixed costs of entry), the average-marginal cost gap of national brands in the category, and bargaining. Costs include the difficulty of finding a supplier, and store and chain dummies that proxy for organizational features like official store brand programs and store brand managers. The error in the regression represents unmeasured or unobserved costs or benefits of introducing a store brand in the category for that organization. Examples might include local tastes, an usually convenient supplier, or retailer dislike of a particular brand representative.

5.1 Data

We use supermarket data originally collected by IRI from consumers and stores in a large mid-Western US city.[26] We exploit primarily the rich cross-sectional variation in the data; it contains 5 organizations (chains), 9 stores, and information on 82 categories for each store over two years, from June 1991 to June 1993. (We refer to this time period as 1991 and 1992, although the data for a year include the last 6 months of a year and the first 6 months

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[25]This has been used in other studies such as Narasimhan and Wilcox (1998).

[26]Other research using this dataset includes Bell and Lattin (1998) and Ho, Tang, and Bell (1998)

of the next.) The data track over one thousand households and over one hundred and fifty thousand shopping trips. We are not primarily interested in the household-level data, but make limited use of it by constructing demographic information for the stores in the sample. Rather than calculate statistics that describe the existing customers of each store, we instead draw neighborhoods (a radius) around each store and calculate mean values of the available characteristics for that population.

We form averages of demographic variables that have proven important in previous studies: age, income, percent non-white, occupational category, and family size.[27] In the data, occupational category is coded as one of several different types of job. For each adult with job type "managerial" or "professional" we give the household a one. Then these scores are averaged across households in the radius of the store to create a variable measuring the abundance of professional consumers. We also have a variable that indicates if there are young children in the household (under 11). Its mean by store area is strongly correlated with family size mean (.85) and we find that exchanging the two in the empirical work makes no difference to the results. Thus, we use family size and interpret it as mostly representing the presence of children.

The product categories we use follow the IRI definitions (we typically use IRI "type" which is a more detailed subset of a category). Each item is described in detail in the dataset: category, name, size, market share, and manufacturer. We categorize an item as a store brand if its manufacturer is listed as "Private Label." The dataset does not distinguish the type of private label, therefore we cannot tell if a product is Presidents' Choice or Jewel brand cookies. With regards to "premium" store brands this is not a major drawback for our sample period since premium store brands have become important only in the last few years. Our dependent variable expresses whether the number of store brands in a given category is nonzero or zero. About 54 percent of observations (category-store-years) have at least one store brand present. The largest variation is across categories; approximately 10% of categories have no store brand regardless of the store, chain, or year they belong to. Similarly, about 10% of categories always have a store brand. The mean percentage of categories with store brands varies less across chains. In our data the highest level is 65% and the lowest is 40%. Only 6% of category-stores have different values of the dependent variable across years. Within a chain there is a little variation across stores. About 5% of chain-categories carry a store brand in only a subset of stores in the chain. We find that there is on average a 26% difference between the maximum and minimum number of "Private Label" UPCs carried by stores in a single chain (omitting the chain with only one store.) This indicates that there is surprising variability in store brand

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[27]Previous research such as Cotterill, Dhar, and Putsis (1997) and Dhar and Hoch (1997) has found that education, age, and lack of wealth increase the share of private labels.

strategy at the store level.

However, because a store manager can only stock a store brand product which the chain has invested in acquiring, the credible threat discussed in the model section is primarily exercised at the chain level. On the other hand, the store manager does not have to carry a store brand and has some local control over promotion, shelf allocation, and price-setting. The store manager may also be able to independently source a broker label such as "Country's Delight" that does not have the chain's name on it. Although we do not address this point in the paper, the implication of our model is that the most effective (profitable) organizations will be those where supply terms with the national brand are negotiated with the part of the organizational hierarchy that decides how to source and position a named store brand. Because the chain-level decisions are most interesting to us, we create a chain-level dependent variable that takes a one if any of the stores in that chain carry a store brand in that category and zero otherwise.

We model causality in the following way. We assume that the national market structure in year t causes a store (or chain) to develop a store brand to improve its bargaining situation, or not. The store is unable to offer the store brand to consumers until some time after it decides it wants the product because it has to find an appropriate supplier, decide on the characteristics of the product, give the supplier time to make investments, test the quality of the product, etc. Because of the data we have, we use a four-year lag between the measurement of market structure and the observation of the store brand. While this is likely to be somewhat longer than a store needs to source and refine a store brand, we are more concerned to avoid too short a period. The reason is that the sale of store brands will affect structural features of the market over time, whereas we want to focus on the reverse causality: the structural features determining the likelihood of the store carrying a store brand. In particular, a popular leading brand may attract a store brand, which then erodes the market share of that leading brand. If so, a researcher looking at market structure after the store brand has achieved success will not see a relationship between leading brand market share and store brand introduction.

Our independent variables come from national, not store level, data, in the year 1987. This allows the measures to pre-date the store's choice of store brand in 1991 through 1993.[28] Because there is no "start date" when supermarkets were allowed to introduce store brands (as there is in the pharmaceutical industry due to patents, for example), it is impossible to choose an initial year in which market structure does not reflect any effect of store brands. However, the late 80s is a relatively good baseline because it was a time of prosperity (when there is relatively less emphasis on store brands), while our store brand data come from the

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[28] Of course, the market share of the leading national brand in a particular store in 1991 will affect store brand choice in 1991, but only because it is correlated with leading national brand share in previous years. If we included the current data, the information it would add would predict store brand choice in subsequent years.

years in, and immediately following, a recession when more retailers focused on store brands. In addition, some industry observers claim there was a one-time shift toward store brands in the 90's because of their continued popularity despite a strong expansion.[29] In any case, if the existence of store brands in the late 80s changed market structure (ie. eroded the share of the leading national brand) it will only weaken our results; we would find that some categories have store brands, but these categories do not look different from other categories since the previously strong leading brand has been weakened.

Ideally, we would like to include the market share of the leading brand *in the supermarket* in question in 1987 as an explanatory variable for stocking a store brand. Clearly this measure is an important element driving store decisions. However, we do not have that data. The national data, while not reflecting local conditions, are an average of local conditions and also provide data on the store's options beyond what it might be carrying currently, which also affect its incentives.

From the IRI Marketing Factbook of 1987, we recorded the market share of the leading brand in the category, the total number of brands in the category, and the category revenue per one thousand households. From the survey of Leading National Advertisers (LNA) we collect advertising dollars (in thousands) for seven media they track (network TV, cable TV, other TV, network radio, newspapers, magazines, outdoor media). These advertising outlays are *brand specific* at quite a detailed level, so we were able to make sure the advertising data and the revenue data were collected for the same product. Our last variable is somewhat less official in origin, as it is the result of a survey conducted on MBA students at the University of Chicago. We wanted to get a sense of consumers' attitudes toward risk and felt that a survey was the best way to measure consumer preferences across categories. Students from several classes filled out a questionnaire that asked them to rate each of our categories on the question, "How likely is it that you might unknowingly pick a poor quality product in this category?" and asked them to indicate if they regularly buy products in that category. They answered the question for each category with a rating from 1 to 5, with the endpoints being described as "not at all likely" and "very likely." Omitting incomplete surveys, we take the mean of 141 student answers for each category and form a variable that indicates when consumers feel they lack the information to choose a quality product. We only use the responses of students who regularly purchase in the category as it turns out this is a more powerful explanatory variable than the total mean. Finally, for each store, chain, and year, we form dummy variables to control for any unmeasured differences – constant to those units – in their propensity to carry a store brand.

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[29]Progressive Grocer, January 1990, page 75 and Narasimhan and Wilcox (1998), page 573.

5.2 Specification

Several of our conjectures posit a potentially non-monotonic relationship between the variable and the profitability of a store brand. For example, advertising should create a wedge between average and marginal cost that makes the category attractive to a store brand, but at some point, the advertising of the national brand might become so effective at creating a valued image that it is no longer worth introducing a store brand. Therefore, we include an advertising-to-sales ratio of the leading national brand as well as dummy variables that indicate whether the ratio is in the top or bottom quintile of the distribution. This specification is especially important because the advertising-to-sales ratio has significant range: the bulk of the categories are close to zero, but the ratio ranges all the way up to two. (Recall that units are advertising dollars in thousands to revenues per one thousand households.) This large range seems to indicate measurement error of some kind, perhaps made worse by the construction of the ratio of two variables. However, the data sources for advertising and revenues are the best available and are standard sources in the literature, so there is no better alternative. The dummy variables for high and low quintiles mitigate the effect of the extreme values of the advertising to sales ratio. Note that we use the advertising to sales ratio to avoid mistakenly associating store brands with large advertising expenditures when the relationship is actually with large categories.

We might expect the effect of economies of scale in introducing a store brand to taper off once a category reaches a sufficiently large size. Therefore category revenue is included in both a linear and a squared form.

The previous literature often includes the number of manufacturers and/or the number of national brands in the category as an explanatory variable in predicting either store brand share or the existence of a store brand (See Raju et al. (1995) and Dhar and Hoch (1997)). In these models the number of manufacturers in the category is likely to be picking up some of the effects of bargaining in the following way. If there are only a few national manufacturers, they may be able to extract more profit from the category. Therefore the retailer has more incentive to improve its bargaining position and, coincidentally, the category contains a few, large share products. All else equal, we expect higher concentration - fewer manufacturers - to give the retailer an incentive to introduce the store brand. In our study, however, we have controlled for the market share of the leading national brand. Thus we can use the number of manufacturers in the category to provide information about supply conditions rather than bargaining power. The more manufacturers are actively producing national brands in the category, the less likely it is that there are intellectual property barriers to entry, and the more likely the store can easily find a manufacturer for its store brand. Therefore we expect that the number of manufacturers

in the market, conditional on the share of the leading brand, will positively affect the probability of a store brand in the category. The number of manufacturers in a category ranges from 1 to 47. In our specification, we include the number of manufacturers as a continuous variable as well as dummies for large and small categories in case the relationship is nonlinear: markets with more than 24 manufacturers and markets with fewer than 4 manufacturers are allowed additional coefficients.

Finally, we include the interaction between the advertising to sales ratio and the share of the leading brand as an additional explanatory variable. Categories where the leading national brand has been spending a lot on advertising and has also been very successful in generating market share are likely to be categories with some kind of genuine innovation or national brand capability. There are no category dummy variables in the specification (not enough degrees of freedom), so we include the interaction term as the best way to measure successful advertising. These categories are less likely to be profitable for the store brand because it will be difficult for the store product to become an effective substitute for the national brand.

Restricting the sample to complete observations leaves us with 1210 observations at the store-category level (640 first year, 570 second year) and 728 at the chain-category level (366, 362). Summary statistics are contained in Tables 2 and 3. The probit model we estimate is

$$Pr(\text{Store Brand}_{coy}) = \Phi(\beta_1 X_c + \beta_2 X_o + \beta_3 \text{Year}) \tag{11}$$

where the dependent variable is a one in each category-organization-year (c, o, y) if a store brand exists and is zero otherwise. Explanatory variables are divided into three matrices according to the dimension described, category, organization, or year.

6 Results

The results are presented in tables 6, 7, and 8 on pages 38 through 40. There is variation in both demographics and in the stocking of store brands within a chain, so we begin by focusing on the decision at the store level. In Table 6, we use the entire sample and estimate two different specifications, one with store and chain dummy variables and one with demographic variables. The coefficients of interest do not change appreciably between columns, so we will focus on column 1. The marginal effect of each variable can be obtained by multiplying the estimated coefficient times the $\phi(\bar{X}\hat{\beta})$ in the last row of the table. This is the amount by which the probability of carrying a store brand varies with changes in X.

The main test of the bargaining effect of store brands is provided by the variable *leading brand market share*, which has a positive and significant effect on the likelihood of the retailer

Variable N=1210	Mean	Std Dev	Min	Max
Store Brand	.538	.499	0	1
Leading brand share	30.1	17.3	4.1	75.0
Category Revenue	6437.3	7147.1	19.8	26700.1
Squared Cat Rev	9.25E07	1.67E08	393.3	7.13E08
Ads/Sales leading brand	.119	.336	0	2.63
Lowest Ads/Sales	.189	.392	0	1
Highest Ads/Sales	.207	.405	0	1
Ads/Sale*Brand Share	4.99	21.99	0	183.5
Number of Manufacturers	12.4	11.2	1	47
Manufacturers > 24	.137	.344	0	1
Manufacturers < 4	.191	.393	0	1
Consumers uncertain about quality	2.37	.409	1.31	3.24
Family Size	2.51	.481	1.67	2.89
Income	36328.8	5102.2	26677.4	42186.6
Non-white	.208	.037	.148	.269
Age	48.4	4.82	42.3	55.4
Occupation	.397	.102	.262	.535
Store Brand Market Share	.076	.149	0	1
SB Market Share if > 0 (N=651)	.142	.179	8E-06	1

Table 2: Summary statistics (store level observations)

Variable N=728	Mean	Std Dev	Min	Max
Store Brand in Chain	.559	.4989	0	1
Leading brand share	30.1	17.3	4.1	75.0
Category Revenue	6519.4	7193.3	19.8	26700.1
Squared Cat Rev	9.42E07	1.68E08	393.3	7.13E08
Ads/Sales leading brand	.120	.334	0	2.63
Lowest Ads/Sales	.188	.391	0	1
Highest Ads/Sales	.206	.405	0	1
Ads/Sale*Brand Share	4.98	21.81	0	183.5
Number of Manufacturers	12.4	11.1	1	47
Manufacturers > 24	.137	.344	0	1
Manufacturers < 4	.188	.391	0	1
Consumers uncertain about quality	2.37	.413	1.31	3.24
Family Size	2.54	.477	1.67	2.89
Income	34760.0	5272.3	26677.4	42186.6
Non-white	.208	.043	.148	.269
Age	48.4	5.18	42.3	55.4
Occupation	.374	.098	.262	.535

Table 3: Summary statistics (chain level observations)

Store	obs	% obs
Store 1	146	12.07
Store 2	146	12.07
Store 3	142	11.74
Store 4	144	11.90
Store 5	145	11.98
Store 6	145	11.98
Store 7	72	5.95
Store 8	139	11.49
Store 9	131	10.83

Table 4: Number of Category-Years by Store

Chains	obs	% obs	number stores
Chain A	146	12.07	1
Chain B	349	28.84	3
Chain C	281	23.22	2
Chain D	289	23.88	2
Chain E	145	11.98	1

Table 5: Number of Category-Years by Chain

introducing a store brand into the category. The marginal effect is a 0.4% increase in the probability of the retailer carrying a store brand for every one percent increase in the share of the leading national brand. For example, increasing a national brand share from 20% to 50% would increase the probability of a store brand in the category by 12%. This is an economically meaningful effect and is the primary evidence we have for the importance to the retailer of altering the balance of power with that brand. The result stands in contrast to the previous literature. Raju et al. (1995) analyze the same dependent variable and find that retailers introduce private labels into categories with more competition, or a greater number of national brands. Since the number of national brands will be lower the larger the share of the leader, all else equal, their result suggest the opposite of ours. *Category revenue* has a positive and significant effect. This is consistent with economies of scale in store brand introduction; larger categories attract more entry. The negative coefficient on the squared term implies that attractiveness increases at a decreasing rate as the fixed cost of store brand introduction is spread over more units. However, this result diminishes in significance in later regressions.

The *advertising to sales ratio* has a positive and significant coefficient, which suggests that the categories with large margins between marginal and average cost are more profitable for store brands. Raising the advertising to sales ratio from 0.5 to 1 (a large change in our data) increases the probability of a store brand by about 15%. The attractiveness of a large margin is further supported in the coefficient on *lowest advertising to sales ratio*, which is negative and

significant. A retailer is 5% less likely to introduce a store brand in a category in which there is essentially no wedge between marginal and average cost. The result does not support, however, that national brand advertising is effective in discouraging consumers from purchasing store brands.

The interaction between advertising to sales ratio and leading brand market share is strongly negative and significant, as expected. A one standard deviation increase in this variable from its mean value would decrease the probability of a store brand by 11%. Again, this reflects the uneven effect of national brand advertising as reflected in subsection 4.1. If advertising is sufficiently successful and consumers get utility from it, they will be less willing to purchase the store brand.

Consumer preferences - as measured by our survey of MBA students - are important to the introduction of store brands. If consumers who regularly purchase in the category are unsure whether they can choose a quality product, the tendency to introduce store brands is significantly lower; a one point increase on our scale translates into a 11% decline in the probability of a store brand. Our certification conjecture suggests that consumers would trust the store brand name and feel confident of purchasing the product. However, it appears that the store brand name is not strong enough to overcome quality uncertainty; it requires national advertising. Hoch and Banerji (1993) find that variability in private label quality reduces its sales, a similar concept to the one we discuss here. Additionally, we cannot measure whether the store brand has the name of the store written on it. To the extent that some of our categories have private labels without the store name, we would not expect a certification effect to exist.[30]

The *number of manufacturers* in the category is positively related to the likelihood of store brand entry, as expected. Five additional manufacturers increase the probability of a store brand - conditional on the leading brand's market share – by 7%. However, the most populated markets, those with 25 manufacturers or more, seem different. The dummy coefficient for those markets is large and negative. Perhaps there is enough competition in these markets to render a store brand unnecessary. Further work is necessary to fully understand why these markets have a different tendency to include store brands.

The fixed effects for years, stores, and chains are also reported in the table; only those for chains are significant at conventional levels. The coefficient on the year dummy for first year indicates there is no statistically significant change in the average propensity to carry store brands between the two years. The chain dummies correspond to one author's experience

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[30]Dhar and Hoch (1997) include the variable, "does the store have a private label quality program," and find that this predicts a higher level of private label sales. In our context, having such a program would make the store more likely to introduce a private label, which would show up in the store or chain fixed effect. The effect we find operates differentially across categories within a store.

with the strategies of these supermarkets. Chain C is more likely to carry a private label than Chain A, as is Chain B to a somewhat lesser extent. Chain D, however, is a somewhat more upscale store and is less likely to have a store brand. Column 2 of the table runs the same specification again, but this time includes demographics rather than fixed effects for the stores. Larger families and higher incomes both discourage stores from carrying store brands. Non-white residents, older residents, and consumers in higher occupational category (our proxy for education) encourage the stocking of store brands. These demographic results are consistent with previous results such as Dhar and Hoch (1997), except that they find non-white consumers lower market share of store brands while we find that non-white consumers increase the likelihood of a store brand in a category. As mentioned above, our family size measure is very highly correlated with the presence of young children in the household. We conjectured that parents might be risk-averse and purchase brands for the safety of their children, and this is consistent with the empirical results. (Although it may instead be that children drive demand by insisting on the cereal with Tony the Tiger rather than the store brand.) It is interesting to note that a specification that includes both chain dummies and demographic information results in no significant coefficients on those variables. It appears they are quite collinear; this may be because chains have a store brand strategy and then choose locations (consumer populations) compatible with that strategy.

Because only 6% of the observations show a different value of the dependent variable between the two years, while our independent variables remain constant, we also run specifications for each year separately. Table 7 on page 39 therefore repeats the regressions for each year of observation. There are two minor differences between the two tables. Squared category revenue and the lowest quintile of advertising lose significance at conventional levels, although the point estimates remain steady. The years are a little asymmetric in that in the 1991 sample marginal effects decline slightly, while in the 1992 sample, they rise for some coefficients. Our third table of results (table 8 on page 40) examines the decision to carry a store brand at the chain level, since this is likely to be the level at which credible threats can be made. We create a dependent variable for this specification by assigning the chain a "1" if any store in the chain carries a store brand in the category. The results are quite similar. The major differences are that the significance of the advertising to sales variable drops to the 10% level in 1991 and becomes insignificant in 1992. The interaction term also slips below conventional significance levels in the 1992 sample, due to the point estimate falling somewhat. Of course, the sample size is also considerably smaller in these specifications.[31] In both specifications the market share of

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[31] We also try creating a sample-wide average probability of stocking a store brand in a particular category (N=82 in one year). Using ordinary least squares, we run the same specification on this dependent variable and find the market share of the leading brand continues to have a positive and significant coefficient.

the leading brand continues to have a statistically and economically significant impact on the probability of carrying a store brand.

We know the number of UPCs in the category and one might think that this information could be used to create some proxy for the extent of differentiation in the category, thereby helping us measure one incentive to introduce a store brand. The problem is that categories vary enormously by size (ad hoc definitions by IRI), so that the number of UPCs mostly measures the size of category. In theory, even if the number of UPCs did measure the differentiation in a category, it would provide no information on how tightly packed the category is, i.e how "close" the closest substitute is to any given product. (We imagine that more products can "fit" in the pre-sweetened cereal category than the sugar category and yet probably think different brands of sugar are closer substitutes.) In addition, an argument along the lines of Sutton (1991) suggests that advertising can reduce entry and perhaps therefore the number of UPCs in the category. In fact, we find a negative relationship between the advertising to sales ratio and the UPC measure in our data. If we include the number of UPCs in the regression, the marginal effect of the share of the leading brand remains steady but the effects of category revenue and advertising to sales variables decline, as expected. Since there is no good theoretical argument for using this specification, we do not pursue it further.

Alternative explanations for evidence of store brands as bargaining tool

So far the discussion has focused on whether the empirical evidence is consistent with the hypothesis that store brands affect bargaining between manufacturers and retailers. However, as discussed in section 4, we expect other forces also to shape the decision to carry a store brand, particularly the opportunity to price discriminate and to earn higher price-cost margins. A necessary question to ask is, therefore, does the incentive to introduce a store brand for price discrimination or margin reasons increase with the market share of the leading brand?

To understand how leading brand market share might be related to the price discrimination motivation described in subsection 4.1, suppose that a large leading brand market share indicated a large segment of consumers close to the location of the leading brand in horizontal product space. By imitating the leading brand with a store brand the retailer could vertically discriminate between consumers that differ in the utility that they derive from the brand associations created through advertising and in their aversion to unintentionally consuming a low quality product. Then, conditionally on the retailer benefiting from higher total channel profits, a larger market share of the leading brand would make selling a store brand more worthwhile, given some fixed costs of introduction. This implies that store brand market share after introduction should be increasing in the initial market share of the national brand. Per-

haps the reason the national brand is the "leading" brand is because it got to the spot with the best demand first. Hence the store brand may be imitating the national brands positioning to maximize sales, not to improve bargaining terms.

To disentangle these motivations, we run a standard least squares regression using a different dependent variable: store brand revenue share. If the retailer is simply entering those locations in product space where imitation will generate the most sales, then high store brand market share (in the category) should be correlated with leading national brand market share. The results of the regression are reported in Table 9. Notice that the number of observations falls because we are restricted to using categories in which there exists a store brand and therefore share is greater than zero. The coefficient on the share of the leading national brand is small and *negative* in both years. A high share for the leading national brand does not successfully predict the share of its imitator, yet it does predict store brand entry. This combination of results suggests that retailers must gain from stocking a store brand against a powerful national brand, even when the store brand doesn't attract market share. These results fit nicely with the predictions in our discussion of "efficiency in product choice" at the end of the model section on page 15, namely that the market share of the store brand is a poor indicator for the strategic importance of the store brand for the retailer.

Other coefficients change in the regression, as one would expect. The interaction term becomes positive, since the sample contains only categories with a store brand. Conditional on entry, those categories with a high leading brand share and also a high margin sell more store brands. Low advertising categories also have high store brand share, presumably for the same reason the store brand entered. Store brands appear to have difficulty gaining share in markets where there are only a few manufacturers active in the market. This may reflect barriers to entry such as intellectual property, perhaps requiring the store brand to take a lower quality position. We obtain the same results if we run a more sophisticated specification than has normally been used in the literature. The results from a Heckman selection procedure that accounts for which categories get selected to have store brands is available from the authors on request. Even when using category size and store dummy variables to identify the entry of a store brand, leading national brand share fails to significantly predict store brand market share.

Leading brand market share might also be related to the margin motivation described in subsection 4.2. Suppose the leading brand had achieved its market position due to advertising (an argument along the lines of Sutton (1991)). This implies that the leading brand's average costs are substantially higher than its marginal costs of production, allowing the retailers to achieve high price-cost margins with an (unadvertised) store brand. As a result, there might be a positive relationship between margin and leading brand market share that is not

directly causal, but works indirectly through advertising. A retailer might enter a category with higher leading brand market share because the advertising necessary to achieve that market share ensures a large gap between average and marginal cost. The empirical evidence does not support this explanation. Since we can measure advertising to sales directly, the margin motivation for carrying a store brand should be – and is – captured by the coefficient of the advertising to sales ratio, rather than by the coefficient of the leading national brand share. Recall we include an interaction term between leading brand share and 'price-cost margin' (as proxied by advertising to sales). A positive coefficient on this interaction term would be evidence for a margin motivation that is enhanced by the share of the leading brand. In fact we find the opposite. Markets with both high advertising to sales ratios ('margin') and high leading brand shares are less likely to include store brands.

7   Concluding remarks

In this paper we introduce a model that explains why a store brand can change the distribution of profits between a retailer and national brand manufacturers in its category. We also provide empirical evidence that the introduction of store brands by retailers is consistent with this profit redistribution purpose rather than a demand-location motive. We find that retailers are more likely to carry a store brand in a category if the share of the leading national brand is higher, indicating that there is a bargaining motive for the introduction of the store brand. Furthermore, the share of the leading national brand does not successfully predict the market share of the store brand in the category.

We propose that this is because the retailer can position the store brand to mimic the leading national brand. By improving the retailer's disagreement payoff, the store brand decreases the incremental contribution of the leading national brand to category profits, thus allowing the retailer to improve its supply terms with the manufacturer. These terms may or may not involve promoting sales of the store brand. Our argument relies on the distinction between national and store brands where store brands differ from other brands in being both unadvertised and located at a position in product space that is determined by the retailer instead of by a manufacturer. We confirm empirically that many store brands closely imitate national brands.

We also find empirical evidence that retailers can use store brands to price discriminate among consumers and to exploit the marginal–average cost gap of national brands. Both lower advertising and consumer concern about quality decrease the probability that a supermarket carries a store brand. When both advertising to sales ratios and leading brand share are high, however, store brand entry is discouraged, suggesting that image (or innovation) advertising is effective. In addition, a retailer is more likely to carry a store brand in categories with larger

revenues, indicating economies of scale to introducing a store brand. While these latter results are consistent with the previous literature, our approach avoids the endogeneity problems found in prior work, thus lending more credence to these findings.

We contribute to the store brand literature by introducing that retailers can strategically position store brands in product space to strengthen their bargaining position when negotiating supply terms with manufacturers of national brands.

We see three avenues for future research. First, due to data limitations we have not fully exploited model predictions. For example, we do not derive detailed comparative statics on the measures of horizontal and vertical differentiation. Also, we do not test our predictions about incentives to introduce store brands as they relate to the retailer's bargaining power vis-a-vis manufacturers. Second, our discussions with store brand managers suggest that store brands rarely innovate in a product category, implying that the costs of introducing a store brand will be lower if the product is one that can be easily imitated. Generally, one would expect that more R&D intensive products will be more difficult to imitate, and therefore that these product categories will be less likely to include a store brand. We were unable to obtain R&D data for this project, but we believe that its addition would certainly enrich the empirical work. Lastly, we would like to supplement our dataset with direct information on imitative packaging of store brands.[32] This would permit an exploration of the reasons behind a retailer's choice to create a store brand that is an exact substitute for a national brand versus introducing a store brand that is a differentiated or purposefully low-quality product.

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[32]While the data on imitation shown in the introduction covers a subset of the same stores as our main dataset, it was collected later than the sample period.

Total channel profit and joint profits

Simple maximization yields the following maximized profits $\Pi_{i,j}^{k,h}$ and Π_i^k where $i, j \in \{x, y, s\}$ and $k, h \in \{1, 2\}$.

$$\Pi_{x,s}^{1,1} = \begin{cases} \frac{\tau}{4-4\alpha(1-\tau)} & \text{for } \tau > \frac{\alpha}{1+\alpha} \\ \frac{\alpha}{4} & \text{for } \tau \le \frac{\alpha}{1+\alpha} \end{cases} \tag{A-1}$$

$$\Pi_s^1 = \begin{cases} \frac{s\tau}{4-4\alpha(1-\tau)} & \text{for } \tau > \frac{\alpha}{1+\alpha} \\ \frac{s\alpha}{4} & \text{for } \tau \le \frac{\alpha}{1+\alpha} \end{cases} \tag{A-2}$$

$$\Pi_{x,y}^{1,2} = \frac{1}{4} \tag{A-3}$$

$$\Pi_y^2 = \begin{cases} \frac{\tau}{4(\alpha+\tau-\alpha\tau)} & \text{for } \tau > \frac{1-\alpha}{2-\alpha} \\ \frac{1-\alpha}{4} & \text{for } \tau \le \frac{1-\alpha}{2-\alpha} \end{cases} \tag{A-4}$$

$$\Pi_x^1 = \begin{cases} \frac{\tau}{4-4\alpha(1-\tau)} & \text{for } \tau > \frac{\alpha}{1+\alpha} \\ \frac{\alpha}{4} & \text{for } \tau \le \frac{\alpha}{1+\alpha} \end{cases} \tag{A-5}$$

$$\Pi_{x,s}^{1,2} = \begin{cases} \frac{\tau}{4-4\alpha(1-\tau)} & \text{for } \tau > \frac{\alpha+s-\alpha s}{1+\alpha-\alpha s} \\ \frac{s+\alpha-s\alpha}{4} & \text{for } \tau \le \frac{\alpha+s-\alpha s}{1+\alpha-\alpha s} \end{cases} \tag{A-6}$$

$$\Pi_s^2 = \begin{cases} \frac{s\tau}{4(\alpha+\tau-\alpha\tau)} & \text{for } \tau > \frac{1-\alpha}{2-\alpha} \\ \frac{s(1-\alpha)}{4} & \text{for } \tau \le \frac{1-\alpha}{2-\alpha} \end{cases} \tag{A-7}$$

Lemma 2 *Assume* $\alpha \in (1/2, 1]$, $s \in (0, 1)$, $\tau \in (0, 1)$. *Then the following holds:*

$$\Pi_s^1 > \Pi_s^2 \tag{A-8}$$

$$\Pi_y^2 > \Pi_s^2 \tag{A-9}$$

$$\Pi_{x,y}^{1,2} \ge \Pi_x^1 \tag{A-10}$$

$$\frac{\partial \Pi_x^1}{\partial \alpha} > 0 \tag{A-11}$$

Proof: *Follow directly from the above derivations of maximized channel profit.*

Claim 1 *For all* $(\alpha, \tau, s) \in \Omega$, $\Pi_{x,s}^{1,1} - \Pi_s^1 < \Pi_{x,y}^{1,2} - \Pi_y^2$.
Proof: *From* $\Omega = \{\alpha, \tau, s \mid 0 \le \tau < \frac{1-\alpha}{2-\alpha}, 0 < s \le 1, 1/2 < \alpha \le 1\}$ *it follows that* $\Pi_{x,s}^{1,1} - \Pi_s^1 = \frac{\alpha}{4} - \frac{s\alpha}{4}$ *and* $\Pi_{x,y}^{1,2} - \Pi_y^2 = \frac{\alpha}{4}$. *The claim holds by inspection. Q.E.D.*

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Existence of store brand, full sample 1991-1992

	Store Dummies	Demographics
leading brand share	.0253	.0242
	(.0044)	(.0043)
category revenue	.00014	.00013
	(.00003)	(.00003)
squared cat rev	-2.44-09	-2.30e-09
	(1.21-09)	(1.16e-09)
ads/sales leading brand	1.787	1.660
	(.6730)	(.6494)
lowest ads/sales	-.3119	-.3104
	(.1209)	(.1197)
highest ads/sales	-.1936	-.1876
	(.1523)	(.1505)
ads/sales*brand share	-.0353	-.0336
	(.0096)	(.0093)
number of manufacturers	.0915	.0869
	(.0110)	(.0107)
manufacturers > 24	-2.121	-2.037
	(.2651)	(.2530)
manufacturers < 4	-.1261	-.1147
	(.1447)	(.1441)
consumers uncertain about quality	-.7498	-.7309
	(.1389)	(.1336)
dum second year	.0861	.0908
	(.0903)	(.0864)
dum store 2	-.3435	
	(.1756)	
dum store 3	-.0273	
	(.1816)	
dum store 5	-.2417	
	(.1687)	
dum store 6	-.1909	
	(.1873)	
dum store 7	-.2507	
	(.2079)	
dum chain B	.3601	
	(.1794)	
dum chain C	.7151	
	(.1874)	
dum chain D	-.5695	
	(.1846)	
family size		-9.179
		(1.923)
income		-.0016
		(.0003)
non-white		67.00
		(13.44)
age		.6193
		(.1229)
occupation		95.70
		(20.14)
constant	-.3815	-2.255
	(.4009)	(.7560)
$\phi(\bar{X}\hat{\beta})$	.1496	.1464
Observations	1210	1210
Pseudo R^2	0.3546	0.3239

Table 6: (White robust standard errors in parentheses)

Existence of store brand, by year

	1991	1992
leading brand share	0.0263	0.0223
	(0.0062)	(0.0059)
category revenue	0.0001	0.0001
	(0.00004	(0.00004)
squared cat rev	-2.29E-09	-2.19E-09
	(1.68E-09)	(1.61E-09)
ads/sales leading brand	2.175	1.151
	(0.9064)	(0.9383)
lowest ads/sales	-0.2856	-0.3434
	(0.1671)	(0.1743)
highest ads/sales	-0.2570	-0.1249
	(0.2103)	(0.2149)
ads/sales*brand share	-.0403	-0.0271
	(0.0130)	(0.0133)
number of manufacturers	.0871	0.0884
	(0.0142)	(0.0165)
manufacturers > 24	-2.318	-1.748
	(0.3518)	(0.3626)
manufacturers < 4	-0.1794	-0.0467
	(0.2011)	(0.2088)
consumers uncertain about quality	-0.8736	-0.5907
	(0.1935)	(0.1857)
family size	-8.941	-9.504
	(2.752)	(2.723)
income	-0.0015	-0.0016
	(0.0005)	(0.0005)
non-white	64.25	70.42
	(19.32)	(18.89)
age	0.6010	0.6435
	(0.1769)	(0.1726)
occupation	92.29	99.97
	(28.84)	(28.51))
constant	-2.074	-2.437
	(0.9999)	(1.153)
$\phi(\bar{X}\hat{\beta})$	.1116	.1932
Observations	640	570
Pseudo R^2	0.338	0.318

Table 7: (White robust standard errors in parentheses)

Existence of store brand anywhere in chain, by year

	1991	1992
leading brand share	0.0205	0.0180
	(0.0076)	(0.0073)
category revenue	0.0002	0.0001
	(0.00005)	(0.00005)
squared cat rev	-3.08E-09	-2.00E-09
	(2.24E-09)	(2.14E-09)
ads/sales leading brand	1.991	.8140
	(1.206)	(1.179)
lowest ads/sales	-0.2113	-0.3321
	(0.2176)	(0.2177)
highest ads/sales	-0.1757	0.0714
	(0.2754)	(0.2667)
ads/sales*brand share	-0.0377	-0.0222
	(0.0176)	(0.0169)
number of manufacturers	.0873	0.0830
	(0.0187)	(0.0204)
manufacturers > 24	-2.427	-1.581
	(0.4797)	(0.4589)
manufacturers < 4	-0.0797	-0.0329
	(0.2621)	(0.2517)
consumers uncertain about quality	-0.8161	-0.4074
	(0.2450)	(0.2332)
Chain B	0.5139	0.1061
	(.2448)	(.2532)
Chain C	0.7953	0.5922
	(0.2559)	(0.2451)
Chain D	-.1385	-.4748
	(0.2528)	(0.2420)
Chain E	-.0558	-.3420
	(0.2508)	(.2419)
constant	-.1914	-.6543
	(0.7066)	(.6972)
$\phi(\bar{X}\hat{\beta})$	.1362	.2416
Observations	366	362
Pseudo R^2	0.345	0.316

Table 8: (White robust standard errors in parentheses)

Store brand market share, by year

	1991	1992
leading brand share	-.0012	-0.0004
	(0.0006)	(0.0006)
category revenue	3.39E-07	3.59E-07
	(5.52E-06)	(5.92E-06)
squared cat rev	-5.81E-11	-7.43E-11
	(1.84E-10)	(1.95E-10)
ads/sales leading brand	0.2565	0.1753
	(0.2123)	(0.2334)
lowest ads/sales	.2129	.1941
	(0.0734)	(0.0754)
highest ads/sales	-.1376	-.1397
	(0.0267)	(0.0312)
ads/sales*brand share	.0144	0.0177
	(0.0048)	(0.0052)
number of manufacturers	.0017	0.0019
	(0.0019)	(0.0018)
manufacturers > 24	.0182	-.0077
	(0.0619)	(0.0547)
manufacturers < 4	-0.1194	-0.0921
	(0.0638)	(0.0635)
consumers uncertain about quality	-0.0524	-0.0315
	(0.0223)	(0.0209)
family size	.3344	.0228
	(.4233)	(.3992)
income	.00006	4.02-06
	(0.0007)	(.00007)
non-white	-1.939	.0633
	(2.977)	(2.760)
age	-.0158	0.0027
	(0.0269)	(0.0251)
occupation	-3.478	-0.2880
	(4.408)	(4.162))
constant	-.1261	-.0745
	(0.1561)	(.1832)
Observations	337	314
R^2	0.350	0.322

Table 9: (White robust standard errors in parentheses)