

# IS ONLINE CHANNEL A COUNTERSTRATEGY TO THE STORE BRAND BY THE NATIONAL BRAND?

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## Abstract

*We study the strategic interaction between the introduction of an online channel by a national brand manufacturer (NBM) and the introduction of store brands by the retailer. We consider three models: (i) the base model without the online channel in the market but the retailer is allowed to introduce the store brand; (ii) the base model without the store brand in the market but the NBM may introduce the online channel; and (iii) the model with both the online channel and the store brand in the market. We find that 1) the NBM is not always better off when he introduces the online channel to offset store brand threat, unless the online channel is sufficiently efficient; 2) the retailer's profit depends on the interaction of the following two effects: the direct effect of demand cannibalization from products sold through the online channel; and the indirect effect (the strategic effect) of lower wholesale price given by the NBM. When the online channel is not efficient enough, the indirect effect dominates and the retailer benefits from the introduction of the online channel, which, however, seldom happens in our cases. Moreover, the retailer will always be better off when she introduces the store brand to compete with the NBM, which hurts the NBM all the time. Our study enriches the literature by proposing that online channel may be a counterstrategy of NBMs when facing the threat of store brand introduced by the retailer.*

*Keywords: dual channel, store brand, counterstrategy, game theory*

# 1 INTRODUCTION

As store brands (SBs), also known as private labels, continue to grow in sales and quality in the world's market, the incumbent national brand manufacturers (NBMs) no longer enjoy the monopolistic power of the supply chain. On one hand, the introduction of SBs cannibalizes sales of national brands (NBs), which is direct detriment to NBMs; on the other hand, the new competitive element in the manufacturer-retailer relationship change the strategic interactions between the two parties. Previous research confirms that the introduction of SBs shift NBM's optimal strategies, theoretically (e.g. Corstjens & Lal 2000; Sudhir & Talukdar 2004; Chen et al. 2011), and empirically (e.g. Quelch & Harding 1996; Chen et al. 2010; Ailawadi & Harlam 2004; Sayman & Raju 2004; Sethuraman 2009). For instance, Bontems et al. (1999) suggests the NBM may increase the wholesale price as SB goods become a closer substitute for it. Meza and K. Sudhir (2010) found that SBs help retailers gain bargaining power for lower wholesale prices, especially in niche categories.

The retailer, on the other hand, should face the positioning decisions are rather important (e.g. Sayman et al. 2002; Morton & Zettelmeyer 2004; Du et al. 2005; Choi & Coughlan 2006). For instance, Caprice (1998) studied how the retailer decides the quality of its private label when it also sells an NB product, and showed that the retailer makes the private label a close substitute for the NB product when marginal cost depends on quality and the quality decision is strongly irreversible. Some studies investigated optimal product line design as consumers incur costly deliberation to recognize their valuations for quality (Guo & Zhang 2012; Bertini et al. 2012; Xiong & Chen 2013).

When SBs become profitable for retailers, NBMs are threatened. When faced with a potential or realized threat of SBs, how should the NBM react? Mills (1999) examined several manufacturer counterstrategies towards private label: "fighting brands", nonlinear pricing measures, and coupon programs; and found that some of these measures work better than others in terms of increasing the NBM's profit and stemming the diversion of profits to the retailer. Nesser et al. (2013) studies the NBM's three general counter-strategies: 1) accommodation strategy that the NBM repositions the products in its existing product line; 2) displacement strategy that the NBM supplies the SB himself to preempt the entry of the SB supplier; 3) buffering strategy that the NBM adds a defender product to intensify market competition.

In the last decade, many manufacturers started to redesign their traditional channel structures by engaging in direct sales, usually through online channels. According to a survey by Tedeschi (2000), about 42% of the top suppliers in industry have begun to sell directly to consumers over the Internet. The literature has documented the strategic causes and outcomes of introducing online channels. In the pioneering paper, Chiang et al. (2003) showed that the threat of introducing a direct channel by a manufacturer can help improve his share of bargained profit with the retailer. In addition, the introduction of a direct channel may not be always detrimental to the retailer because it usually comes with a reduced wholesale price. Kumar and Ruan (2006) found that the optimality of complementing the retail channel with an online channel and the role served by the latter depends critically upon the level of support that the retailer allocates to the manufacturer's product in the absence of the online channel.

How will the online channel strategy affect the retailer's SB strategies or vice versa? Our study tends to understand the strategic interaction between the introduction of an online channel by the NBM and the introduction of store brands by the retailer. Specifically, we try to answer the following questions:

- When should the NBM choose to introduce online channels to compete with the threat of SBs? How the choice of adding online channels change the NBM's optimal strategy, like changes in wholesale price, and does it always benefit him when he has this extra choice?
- How does the online channels affect the optimal decision of the retailer, like her inventory strategy of both NB and SB, and does it always to her detriment?
- What are the strategic roles of store brand in competing with online channel of the NBM?

The rest of this article is organized as follows. The next section first describes the key elements and the construction of three models: model without the online channel, model without the SB, and model with the online channel and SB; then it develops equilibrium solutions for each model. Following that, the third section compares the optimal strategies that the NBM and retailer adopted under each condition. In the last section, we provide a brief summary and implications of our study.

## 2 MODEL AND ANALYSIS

### 2.1 Modeling Framework

Consider a supply chain that consists of one manufacturer (M) of a national brand (N) and a single retailer (R). We adopt the convention of using feminine pronouns for the retailer and masculine pronouns for the manufacturer. In addition, we will henceforth refer to the manufacturer of the national brand as the manufacturer.

We consider a product category in which the retailer has the opportunity to develop her own store brand product (S). Consistent with the literature, we assume that the store brand product is perceived to be of a lower quality than the national brand (ref. to Mills (1995), Raju et al. (1995), Narasimhan and Wilcox (1998), and Chen et al. (2011), among others). Let  $\theta$  denote the exogenous perceived level of quality for the store brand product relative to the national brand. We assume that the quality of the national brand is equal to one and that  $0 < \theta < 1$ . Besides the retail channel, the manufacturer can also establish an online channel to sell the national brand directly. In order to introduce the store brand, the retailer incurs a per unit retail cost  $c_s$ , where  $0 < c_s < \theta$ . Similarly, the manufacturer incurs a per unit retail cost  $c_o$ , where  $0 < c_o < 1$ . Let  $w$  denote the wholesale price of the national brand charged by the manufacturer.

On the demand side, we assume there is a continuum of potential consumers with a total mass of one, and each consumer buys at most one unit of either product N or product S. Consumers are heterogeneous in their valuation for product quality, which we assume, is uniformly distributed on  $[0,1]$  over the population of consumers. We use  $p_n, p_s(q_n, q_s)$  to represent retail prices (sales quantities) of national brand and store brand product, respectively. Based on the analysis of Chen et al. (2011), we derive the inverse demand functions for N and S as follows:

$$\begin{aligned} p_n(q_n, q_s) &= 1 - q_n - \theta q_s \\ p_s(q_n, q_s) &= \theta(1 - q_n - q_s) \end{aligned} \tag{1}$$

To investigate the interaction between the online channel established by the manufacturer and the store brand product introduced by the retailer, we consider three different models. In the first model, the manufacturer sells the national brand through the retailer and the retailer may introduce her own store brand; in the second model, the manufacturer sells the national brand through the retailer and potentially establishes an online channel for product N, while the retailer does not introduce the store brand; in the main model, the manufacturer may establish an online channel while the retailer may introduce the store brand. We use a game-theoretical approach to solve the problem. In stage one, the manufacturer sets the wholesale price for the national brand; in stage two, the manufacturer and the retailer set the sales quantities for national brand sold through online channel (if online channel is established), national brand and store brand (if introduced by the retailer), respectively. The model is described in the following picture.

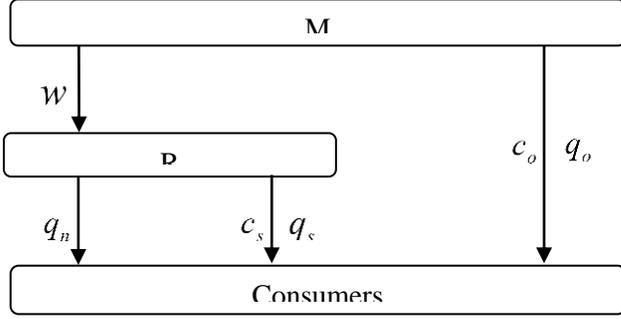


Figure 1. Model description

## 2.2 The Model without Online Channel

As a benchmark, we first consider the model without the online channel opportunity. The retailer decides on whether to introduce the store brand. The manufacturer sets the wholesale price  $w$ , for product N. The retailer chooses sales quantities for both product N and S. The retailer's profit can be expressed as follows:

$$\Pi_R = \max_{q_n, q_s} \{ (p_n(q_n, q_s) - w)q_n + (p_s(q_n, q_s) - c_s)q_s \}. \quad (2)$$

The manufacturer's profit is given by

$$\Pi_M = \max_w \{ wq_n \}. \quad (3)$$

We solve the problem using backward induction. We first identify the retailer's best response quantities for product N and S given the wholesale price. Then we find the optimal wholesale price for the manufacturer. The results are summarized in Theorem 1 as follows.

**Theorem 1.** When the manufacturer does not establish the online channel, the equilibrium can be characterized as follows:

- (i) If  $0 < c_s < \frac{\theta(1-\theta)}{2-\theta}$ , then  $w^* = \frac{1}{2}(1-\theta - c_s)$ ,  $(q_n^*, q_s^*) = \left( \frac{1-\theta + c_s}{4(1-\theta)}, \frac{\theta(1-\theta) - (2-\theta)c_s}{4\theta(1-\theta)} \right)$ ;
- (ii) If  $\frac{\theta(1-\theta)}{2-\theta} \leq c_s < \frac{\theta}{2}$ , then  $w^* = \frac{c_s}{\theta}$ ,  $(q_n^*, q_s^*) = \left( \frac{\theta - c_s}{2\theta}, 0 \right)$ ;
- (iii) If  $\frac{\theta}{2} \leq c_s < \theta$ , then  $w^* = \frac{1}{2}$ ,  $(q_n^*, q_s^*) = \left( \frac{1}{4}, 0 \right)$ .

When the store brand is relatively efficient compared to the national brand, then the retailer has incentive to introduce it. However, when the cost is too high, the retailer is better off only selling the national brand. At the middle range of the retail cost, the retailer's capability of introducing her own store brand plays an important role: although the sales quantity of the store brand is not positive, it puts pressure on the manufacturer to induce a lower wholesale price.

### 2.3 The Model without Store Brand

Now we consider the model in which the retailer does not introduce the store brand. However, the manufacturer can establish an online channel to sell product N. In this model, the manufacturer sets the wholesale price for the national brand; then the manufacturer and the retailer decides on the sales quantities of the national brand respectively. The results are listed in Theorem 2.

**Theorem 2.** In the model where the manufacturers can sell through an online channel while the retailer does not introduce the store brand, the equilibrium can be characterized as follows:

- (i) If  $0 < c_o \leq \frac{5}{7}$ , then  $(\tilde{w}^*, \tilde{q}_o^*) = \left( \frac{5-c_o}{10}, \frac{5-7c_o}{10} \right)$  and  $\tilde{q}_n^* = \frac{2c_o}{5}$ ;
- (ii) If  $\frac{5}{7} < c_o \leq \frac{3}{4}$ , then  $(\tilde{w}^*, \tilde{q}_o^*) = (2c_o - 1, 0)$ ,  $q_n^* = 1 - c_o$ ;
- (iii) If  $\frac{3}{4} \leq c_o < 1$ , then  $(\tilde{w}^*, \tilde{q}_o^*) = \left( \frac{1}{2}, 0 \right)$ ,  $\tilde{q}_n^* = \frac{1}{4}$ .

This result tells that the manufacturer's capability of establishing an online channel plays a strategic role in the interaction with the retailer. When the online channel is very efficient, the manufacturer will sell product N through it which competes with the retail channel operated by the retailer. When it is inefficient, the manufacturer is not going to establish it. At the middle range, however, the manufacturer can use this capability as a threat to the retailer even though he does not really sell any products through it.

### 2.4 The Model with Online Channel and Store Brand

In the main model, the manufacturer has the capability of establishing an online channel to sell product N, while the retailer is endowed with the capability of introducing the store brand. The sequence of the decisions is summarized as follows. First, the manufacturer sets the wholesale price  $w$ ; then the retailer decides the sales quantities  $q_n$  and  $q_s$  for product N and S respectively. At the same time, the manufacturer chooses the sales quantity  $q_o$  of product N for the online channel.

**Theorem 3.** Suppose the NBM can sell his NB product through dual channels, meanwhile the retailer also owns her SB, the optimal strategies for both players are summarized as follow.

- (i) Both the online channel and the SB will be introduced as they are sufficiently efficient, while they will not be introduced as they are relatively inefficient;
- (ii) As the efficiency of the online channel is intermediate, although the online channel will not be introduced, it has potential effects on optimal strategies of two players.

## 3 COMPARISON OF OPTIMAL STRATEGIES

In order to derive out some implications inside the optimal equilibrium of above models, we then compare main variables of them. The answers we propose are driven by two explanatory factors: the efficiency of the SB ( $c_s$ ) and the efficiency of the online channel ( $c_o$ ), somehow, the exogenous perceived level of quality for SB ( $\theta$ ) does also affect the results directly. To exclude some trivial cases that may affect our results, we assume  $\theta$  satisfy the condition of  $\frac{1}{4} < \theta < 1$ , which means the quality of SB product is somehow not too bad that it still play a role in the game of the NBM and the retailer.

### 3.1 Comparison of Optimal Strategies

It is the conventional wisdom to find that the introduction of the online channel (SB) does affect the retailer's (NBM's) decisions of whether to introduce the SB (online channel). Proposition 1, confirms this conventional wisdom, and also provides implications on the interaction of the NBM and the retailer.

**Proposition 1.** Under the assumption that the perceived value of the SB is not too low,

(i) when the online channel is inefficient enough, it has no effects on optimal strategies of both players. However, when the efficiency of the online channel is intermediate, even though no NB products are sold through the online channel, it has potential threat on the retailer and changes her optimal strategies, which in turn changes the NBM's response. The retailer tends to cooperate with the NBM when the online channel is not too efficient, while compete with the NBM as the online channel is efficient enough.

(ii) when the SB is inefficient enough, it has no effects on optimal strategies of both players. However, when the efficiency of the SB is intermediate, even though no SB products are sold in the market, it has potential threat on the NBM and changes his optimal strategies, which in turn changes her own response. When the SB is efficient enough, it is much better for the NBM to seek for cooperation with the retailer by not introducing the online channel.

### 3.2 Comparison of Profits

By comparison, we know that the retailer will always be better off when she has the chance to introduce the SB; however, this is not true for the NBM as he does not always benefit from the introduction of the online channel. Moreover, we also care about the industry profit. Proposition 7 can be directly implied from the comparison results.

**Proposition 6.** When the perceived value of the SB is not too low,

(i) with the existence of the online channel, the NBM (retailer) will be better (worse) off if the online channel is sufficiently efficient, otherwise he (she) will be worse (better) off; especially, the retailer suffers at most times; when the online channel is either very efficient or relatively inefficient, the industry profit will benefit, otherwise, it will hurt.

(ii) with the existence of the SB, the retailer will always be better off, while the NBM will always be worse off; when the online channel is very efficient, it will hurt industry profit; otherwise, it will contribute to industry profit.

From Proposition 6, we can clearly know that the online channel is somehow a useful counterstrategy for the NBM to offset the SB threat when it is sufficiently efficient. Now we come to the consumer welfare, see Corollary 1.

**Corollary 1.** With the introduction of the online channel or the SB, more consumers will enter the market, therefore raise the consumer welfare.

Generally speaking, a perfect competition market is most favorable to consumers since the market supplies the product at marginal cost. When a market is more competitive, it is more similar to a perfect competition market, and the introduction of an online channel is just give a push to this.

## 4 CONCLUSION

In this study, we consider a supply chain consisting of a national brand manufacturer and a single retailer. The manufacturer has the choice of establishing an online channel to sell the national brand to consumers directly by incurring a per unit retail cost. Meanwhile, the retailer is capable of introducing her own store brand of the same product with lower perceived quality level. We examined the interaction

between the manufacturer's online channel and the retailer's store brand introduction. We find that, by establishing an online channel and offering a lower wholesale price, the manufacturer can prevent the retailer from introducing the store brand. Under certain situations, the manufacturer is willing to establish an online channel even though the sales through it are zero. The findings suggest the manufacturer can use the threat of the online channel to partially mitigate the threat of the retailer introducing store brands.

We explore the interaction of two common practices of restructuring supply chain channels. The results suggest that companies may need to consider their channel decisions in a broader context as the decisions may be interdependent. This is work in progress and we believe our further work will provide more insights about firms' channel decisions and efficiency.

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