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Abstract

Umbrella branding is a strategy that consists in using the same name to market different products which may, or may not, be related. The purpose of this paper is to assess under which conditions such a strategy is profitable for a retailer offering, along national brands, its own store brand. The analysis takes into account the strategic interactions between the manufacturers and the retailer, as well as the positive spillover between sales of the private label in different categories.

Key Words: Umbrella branding, Private labels, Game theory, Pricing strategies.

Résumé

La marque parapluie est une stratégie qui consiste à utiliser le même nom pour différents produits offerts dans des catégories qui peuvent être reliées ou pas. L'objectif de cet article est de déterminer sous quelles conditions une telle stratégie est bénéfique pour le détaillant. L'analyse prend en considération l'interaction stratégique entre le détaillant et les manufacturiers des marques nationales ainsi que l'effet de diffusion positif qui se produit entre les ventes des marques du détaillant.

Mots clés : marque parapluie, marques privées, théorie des jeux, stratégies de prix.

1 Introduction

When should a retailer use an umbrella branding strategy? This is basically the question we wish to address in this paper. Umbrella branding means that the retailer gives the same brand name to related or unrelated products in different categories. The opposite strategy is individual branding, that is, the retailer adopts a distinctive brand name for each product in her portfolio. Brand extension is a term often used as a synonym to umbrella branding. Brand extension can be horizontal or vertical. In a horizontal brand extension context, an existing brand name is applied to a new product in the same category or in a different one. An example of brand name used for different products within the same (small appliances) category is Phillips for mixers, iron, coffee maker, etc. An example of an umbrella branding in unrelated categories is BIC for pens and BIC for disposable razors. A vertical brand extension, on the other hand, involves introducing a brand in the same product category at a different price and quality level. In a vertical brand extension situation, a second descriptor is usually introduced along side the core brand name, in order to demonstrate the link between the brand extension and the core brand name, e.g., Marriott Hotels, Courtyard Inn by Marriott.[1] In this paper, we focus on horizontal umbrella branding.

Wernerfelt (1988) states that "an umbrella brand can be used as a bond for the quality of other products with the same name". In other words, if consumers have a positive experience with the brand in one product category, they may update their overall perceptions of the umbrella brand (Montgomery and Wernerfelt (1992)). Thereby, this will reduce consumers' perceived risk in purchasing the (umbrella) brand. In an empirical paper, Wang et al. (2007) confirmed the role of an umbrella brand in creating a high correlation between the perceived quality of products in different categories. More specifically, they treated the case of related versus unrelated categories at warehouse club and they conjecture that the findings should hold for related but not unrelated categories in discount chains such as Target. The reason for finding high correlation, for both related and unrelated products, in warehouse clubs could be the consistent premium-quality positioning of the store brand and the value consciousness of their customers. Singh (2009)[2] explains that using umbrella strategy delivers a consistent positioning of the different products, conveys a unique image, "strengthens awareness and recall of the retailer brand and may even facilitate the consumer's decision-making". The author points out that using the same name is reinforced through the design of the same packaging.

Practitioners[3] follow the same reasoning highlighting quality, image-consistency and building store loyalty as critical factors to using a single brand name. Besides, limited financial resources could be another factor to avoid managing different brands. Indeed, using the same brand name lowers the promotional costs and facilitates the brand trade. Retailers use their best-known brands as umbrella brands for packaging. However, Kapferer (2008) points out that retailers should not use such strategy for anything and everything. The author explains that retailers use umbrella branding in categories that create first and foremost reputation and value for customers. An example would be LG a tech brand that chooses to sell talc or toothpaste or detergent under that name. Obviously, consumers would find it unclear which value is transferred from LG TV sets to a product that they are going to put on their skin or will be used for cleaning purposes.[4]

Previous articles dealing with umbrella branding focused on the risk-reducing effect of such strategy (Montgomery and Wernerfelt (1992), Erdem (1998)), its quality guaranteeing function (Wernerfelt (1988)), measuring spillover effects (Sullivan (1990), Balachander and Ghose (2003)), conditions and incentives to use umbrella branding (Hakenes and Peitz (2008), Erdem (1998)) sources of failure and success when using branding (Aaker and Keller (1990, 1992)) and timing to implement such strategy (Degraba and Sullivan (1995)). A large stream of research studied line extension under the same name (see, e.g., Nijssen and Agustin (2005), Alexander and Colgate (2005), Martinez and Pina (2003), Laforet (2008)).

Private labels are occupying an increasingly important place in retailing.... According to PLMA's 2008 Private Label Yearbook[5], sales of private labels (PL) reached $74.2 billion in major US retail channels.

[1] See www.articlesbase.com
[2] See http://www.goarticles.com
[3] See http://www.india-reports.com and http://business.outlookindia.com.
[4] See http://www.india-reports.com.
[5] See www.plma.com.

Compared to five years earlier, the annual PL sales in supermarkets increased by 13.3% while those of national brands (NB) increased by 7.1%. If still needed, these numbers show that PLs are not a marginal phenomenon in retailing. Their popularity and success are not only due to their competitive prices, but also to their constantly improving quality (see, e.g., Hock and Banerji (1993), Wilensky (1994)). Actually, as reported by ACNielsen, PLs are introducing a variety of innovative tools to boost the sales and ultimately the power of such brands (new flavors, package types, in-store promotions, higher-priced premium PLs, etc.).[6]

Few papers studied branding in the context of private labels (Wang et al. (2007), Thompson (1999)). The former proposes a Bayesian multivariate Poisson-regression model to highlight the benefits of umbrella branding for private labels (PLs) across categories and uncover the factors that increase the likelihood to buy PLs. The analysis is conducted at the retailer level and does not include possible reactions of national brands' manufacturers..... In a descriptive paper, Thompson (1999) highlights the perception of different managers concerning the challenges facing PLs. On the other hand, the literature dealing with UBS for national brands, e.g., Wernerfelt (1988), Erdem (1998), Hakenes and Peitz (2008), skipped the retailer's role and focused on the manufacturer's or on the consumer's role in the decision process. It seems that no paper studied the profitability of an umbrella branding strategy for the retailer in a marketing-channel context where the PL competes against national brands (NBs) in different product categories..... This paper aims at filling this gap. More specifically, we wish to address the following questions:

1. What are the equilibrium wholesale and retail pricing strategies when the retailer implements an umbrella branding strategy (UBS scenario) and when it does not (NO UBS scenario)?
2. Under which conditions UBS is, profitwise, detrimental to manufacturers of national brands?
3. Assuming that UBS creates a positive spillover between the sales of the PL in the different categories carried out by the retailer, are there still conditions under which UBS is a bad strategy for the retailer?

To answer these questions, we propose a parsimonious model where the retailer carries two product categories, each of them consisting of two brands: a national brand and the retailer's PL. We characterize and contrast the equilibrium outcomes of two Stackelberg games, with and without umbrella branding, in which the manufacturers move first by announcing their wholesale prices and next the retailer determines the retail prices. The main results are: (i) by implementing UBS, the retailer succeeds in lowering the wholesale of the NBs and consequently their retail prices; (ii) it is never interesting for manufacturers of NBs to see their retailer implementing umbrella branding strategy; and lastly (iii) there are indeed instances where the retailer is better off not implementing the umbrella branding strategy. It is so because the benefits of the positive spillover effects are actually offset by the loses incurred on the national brands.

The remainder of the paper is organized as follows. In Section 2, we introduce the model. In Section 3, we characterize the equilibrium strategies for the two scenarios and compare them. We briefly conclude in Section 4.

2 The Model

We consider a retailer carrying two product categories. In each category, she offers one NB and one PL. To keep the model general, we do not make any specific assumption on the type and positioning of the NB (e.g., leading NB or second share NB), nor on those of the PL (e.g., white-label generics or premium brand). To isolate the sole effect of umbrella branding on strategies and payoffs, we assume that the two categories are independent, i.e., there is no apparent complementarity or substitutability relationship in terms of demand for the two products (e.g., detergent and frozen juice). We say that the retailer uses an umbrella branding strategy if the PL in both categories carry the same name. In such circumstances, one expects the consumer to make an association between the two retailer's items in terms of factors such as quality, good value for money, environmentally friendly packaging, etc. We shall capture this spillover impact by linking the market potentials of the two retailer's items. In the NO UBS scenario, the retailer is using different names for its two products and the consumer treats them as two different brands. For instance, Sears sells appliances and

[6] See www.allbusiness.com

hardware under two different names, i.e., Kenmore and Craftsman. Besides, Nabisco chose to do a whole new brand when they did Snackwells as opposed to linking it to Oreo or Ritz crackers.[7]

Let $c = 1, 2$ refer to the product category and $b = n, s$ to the brand (n for $n$ational brand and s for $s$tore brand). Denote by p_{bc} the retail price of brand b in category c, and by w_{bc} the wholesale price paid by the retailer to the manufacturer. We follow the literature on private labels (see, e.g., Raju et al. (1995)) and suppose that the retailer buys the store-brand items from non-strategic manufacturers at given wholesale prices denoted $\tilde{w}_{sc}, c = 1, 2$. Put differently, we assume that the retailer has already a long-term contract with PL's manufacturers, which is an industry practice (McMaster (1987)).

We suppose that the demand for a brand in a category depends on the retail prices of both brands, i.e.,

$$D_{bc} = f\left(p_{nc}, p_{sc}\right), \quad b = n, s, \quad c = 1, 2,$$

with

$$\frac{\partial D_{kc}}{\partial p_{kc}} < 0, \qquad \frac{\partial D_{kc}}{\partial p_{lc}} > 0, \quad k, l = n, s, \quad k \neq l.$$

That is, in each category, each brand's demand is decreasing in its own price and increasing in competing brand's price. These are standard assumptions in economics.

We superscript from now on the variables with N in the NO UBS scenario. We adopt the following specification for the demand:

$$\begin{aligned}
D_{n1}^N &= \lambda_{n1} - p_{n1}^N + \psi_1 p_{s1}^N, \\
D_{s1}^N &= (1 - \lambda_{n1}) - p_{s1}^N + \psi_1 p_{n1}^N, \\
D_{n2}^N &= \lambda_{n2} - p_{n2}^N + \psi_2 p_{s2}^N, \\
D_{s2}^N &= (1 - \lambda_{n2}) - p_{s2}^N + \psi_2 p_{n2}^N,
\end{aligned}$$

where ψ_c, $0 \leq \psi_c \leq 1$, is the cross-price parameter in category $c = 1, 2$, and $\lambda_{nc}, 0 < \lambda_{nc} < 1$, is a parameter representing the market potential of national brand $n = 1, 2$ in category $c = 1, 2$. In particular, $\psi_c = 0$ means that the two products in a category are independent, and $\psi_c = 1$ denotes perfect substitution between them. Our specification assumes that the demand for each brand is linear in prices, and that the market potential, that is total category demand when prices go to zero, is equal to 1, independently of the retailer's branding strategy. The linearity assumption is very common in the economics and marketing literature and can be easily justified on the ground that a linear demand is derivable from the maximization of the consumer's utility function. Further, a linear demand is tractable and often a very good local approximation, i.e., in a certain price range, of possible non linearities. The normalization of the market potential to 1 insures that the differences in the results between the two scenarios can be safely attributed to, and only to, the different branding strategies used by the retailer and not to market expansion or shrinking. Actually, if one thinks of the two retailer's possible strategies (UBS, NO UBS) as two treatments in an experimental design, then one wishes to control, as much as possible, for all other factors that may affect the outcome of such experiment. Further, note that the direct-price effect in each category has been normalized to 1 and that the cross-price parameter is assumed to be strictly lower than the direct-price parameter. Again, this is a standard assumption in economics.

When the retailer offers both PLs under the same name (UBS), then, as mentioned before, we expect some spillover effects between the two categories. This spillover is assumed to be proportional to the relative market potential of the store brand to the national brand in the other category. More specifically, under UBS, the market potential of the PL in category c is postulated to be

$$(1 - \lambda_{nc}) + \alpha\left(1 - \lambda_{n3-c}\right), \quad c = 1, 2,$$

where α is the spillover parameter satisfying $0 \leq \alpha \leq 1$. Clearly, the higher the market potential of the PL (or, equivalently, the lower the market potential of NB) in category $3 - c$, $c = 1, 2$, the higher the spillover and the market potential for PL in category c. Back to our example of the two independent categories

[7] See Food Resource (2008) at http://food.oregonstate.edu.

of detergent and frozen juice, our spillover assumption is simply stating that the higher the PL's market potential (a measure of attractiveness, quality, popularity, etc., of the brand) in the detergent category, the higher is its attractiveness in the orange juice category. The rationale for this relationship is that consumers use the information acquired on the brand in one category in their assessment of the same brand in the other category. The demands in the umbrella scenario are then given by

$$\begin{aligned} D_{n1}^U &= \lambda_{n1} - \alpha\left(1-\lambda_{n2}\right) - p_{n1}^U + \psi_1 p_{s1}^U, \\ D_{s1}^U &= \left(1-\lambda_{n1}\right) + \alpha\left(1-\lambda_{n2}\right) - p_{s1}^U + \psi_1 p_{n1}^U, \\ D_{n2}^U &= \lambda_{n2} - \alpha\left(1-\lambda_{n1}\right) - p_{n2}^U + \psi_2 p_{s2}^U, \\ D_{s2}^U &= \left(1-\lambda_{n2}\right) + \alpha\left(1-\lambda_{n1}\right) - p_{s2}^U + \psi_2 p_{n2}^U. \end{aligned}$$

We notice that the two demand systems are nested. Indeed, setting $\alpha = 0$ in the above system leads to the demands in the no umbrella scenario.

Although our model could also easily allow for negative spillover, we only consider the situation where the spillover effect is non negative. The situation where there is a negative effect is excluded because it would then be obvious that the retailer will not implement UBS, or stop using it after having realized that it is damaging. Actually, an empirical observation of positive spillover is provided in Wang et al. (2007) where they find all spillover effects to be positive across the five retained categories. An interpretation is that the umbrella brand infers to new products under the same name a certain awareness, goodwill and association already established in the market.

Assuming profit-maximization behavior, the optimization problems of the retailer and the two manufacturers in the NO UBS scenario read as follows:

$$\begin{aligned} \max_{p_{n1}^N, p_{n2}^N, p_{s1}^N, p_{s2}^N} \pi_R^N &= \left[\left(p_{n1}^N - w_{n1}^N\right) D_{n1}^N + \left(p_{s1}^N - \tilde{w}_{s1}\right) D_{s1}^N\right] + \left[\left(p_{n2}^N - w_{n2}^N\right) D_{n2}^N + \left(p_{s2}^N - \tilde{w}_{s2}\right) D_{s2}^N\right] - F^N \\ \max_{w_{n1}^N} \pi_{M_1}^N &= w_{n1}^N D_{n1}^N = w_{n1}^N \left(\lambda_{n1} - p_{n1}^N + \psi_1 p_{s1}^N\right), \\ \max_{w_{n2}^N} \pi_{M_2}^N &= w_{n2}^N D_{n2}^N = w_{n2}^N \left(\lambda_{n2} - p_{n2}^N + \psi_2 p_{s2}^N\right), \end{aligned}$$

where F^N represents the retailer's merchandising cost, assumed to be fixed. In the UBS scenario, this cost is denoted F^U, with $F^U \leq F^N$. DeGraba and Sullivan (1995) explain that extending the same name to other categories provide a stock of information about the product's quality and reduces the need for advertising. Also, using the same brand name lowers the promotional costs and facilitates the brand trade. Note that in this paper, the association between the two PLs can be related to quality or any other items as mentioned earlier (value, environmentally friendly packaging, etc.). In the UBS scenario, the optimization problems of the three players are given by:

$$\begin{aligned} \max_{p_{n1}^U, p_{n2}^U, p_{s1}^U, p_{s2}^U} \pi_R^U &= \left(p_{n1}^U - w_{n1}^U\right) D_{n1}^U + \left(p_{s1}^U - \tilde{w}_{s1}\right) D_{s1}^U + \left(p_{n2}^U - w_{n2}^U\right) D_{n2}^U + \left(p_{s2}^U - \tilde{w}_{s2}\right) D_{s2}^U - F^U, \\ \max_{w_{n1}^U} \pi_{M_1}^U &= w_{n1}^U \left(\lambda_{n1} - \alpha\left(1-\lambda_{n2}\right) - p_{n1}^U + \psi_1 p_{s1}^U\right), \\ \max_{w_{n2}^U} \pi_{M_2}^U &= w_{n2}^U \left(\lambda_{n2} - \alpha\left(1-\lambda_{n1}\right) - p_{n2}^U + \psi_2 p_{s2}^U\right). \end{aligned}$$

3 Equilibrium Pricing Strategies

We solve a Stackelberg game between the manufacturers and the retailer. The manufacturers move first and announce simultaneously their transfer prices. Knowing this, the retailer selects the price-to-consumer for the four products. As usual, one solves in the reverse order to obtain the follower (retailer) reaction functions to the manufacturers announcements and next solve a Nash game between the manufacturers. The following two propositions characterize the equilibria for both scenarios.

Proposition 3.1 *Assuming an interior solution, the unique subgame-perfect Stackelberg equilibrium in the NO UBS scenario is given by:*

$$
\begin{aligned}
p_{nc}^{N*} &= \frac{\lambda_{nc}\left(3-\psi_c^2\right)+2\psi_c\left(1-\lambda_{nc}\right)+\psi_c\tilde{w}_{sc}\left(1-\psi_c^2\right)}{4\left(1-\psi_c^2\right)}, \quad c=1,2, \\
p_{sc}^{N*} &= \frac{\left(1-\lambda_{nc}\right)+\lambda_{nc}\psi_c+\tilde{w}_{sc}\left(1-\psi_c^2\right)}{2\left(1-\psi_c^2\right)}, \qquad c=1,2, \\
w_{nc}^{N*} &= \frac{\lambda_{nc}+\psi_c\tilde{w}_{sc}}{2}, \quad c=1,2.
\end{aligned}
$$

Proof. See Appendix. □

Proposition 3.2 *Assuming an interior solution, the unique subgame-perfect Stackelberg equilibrium in the UBS scenario, is given by:*

$$
\begin{aligned}
p_{nc}^{U*} &= \frac{\left(3-\psi_c^2-2\psi_c\right)\left(\lambda_{nc}-\alpha\left(1-\lambda_{n3-c}\right)\right)+2\psi_c+\psi_c\tilde{w}_{sc}\left(1-\psi_c^2\right)}{4\left(1-\psi_c^2\right)}, \quad c=1,2, \\
p_{sc}^{U*} &= \frac{\alpha\left(1-\psi_c\right)\left(1-\lambda_{n3-c}\right)+\left(1-\lambda_{nc}\left(1-\psi_c\right)\right)+\tilde{w}_{sc}\left(1-\psi_c^2\right)}{2\left(1-\psi_c^2\right)}, \quad c=1,2, \\
w_{nc}^{U*} &= \frac{1}{2}\left[\lambda_{nc}-\alpha\left(1-\lambda_{n3-c}\right)+\psi_c\tilde{w}_{sc}\right], \quad c=1,2. \\
\lambda_{nc} &\geq \alpha\left(1-\lambda_{n3-c}\right)-\psi_c\tilde{w}_{sc}
\end{aligned}
$$

Proof. See Appendix. □

The wholesale and consumer prices in the NO UBS scenario are clearly positive, and therefore the solution is indeed interior. For the UBS scenario, we shall impose later on some conditions on the parameter value to have an interior solution.

An important question in a marketing channel is how the pricing strategies of the manufacturers and retailers interact. Their decisions are said to be strategic complements (substitutes) if, when one increases, the other increases (decreases). The interest in this question lies in the fact that the actual pricing decisions and the payoffs depend on the type of strategic interactions between the players (see, e.g., Bulow et al. (1985), Moorthy (1988) and Choi (1991)). In our case, these relationships are given by the following derivatives:

$$
\begin{aligned}
\frac{dp_{n1}\left(w_{n1},w_{n2}\right)}{dw_{n1}} &= \frac{dp_{n2}\left(w_{n1},w_{n2}\right)}{dw_{n2}}=\frac{1}{2}>0\ ;\ \frac{dp_{n1}\left(w_{n1},w_{n2}\right)}{dw_{n2}}=\frac{dp_{n2}\left(w_{n1},w_{n2}\right)}{dw_{n1}}=0, \\
\frac{dp_{s1}\left(w_{n1},w_{n2}\right)}{dw_{n1}} &= \frac{dp_{s1}\left(w_{n1},w_{n2}\right)}{dw_{n2}}=\frac{dp_{s2}\left(w_{n1},w_{n2}\right)}{dw_{n1}}=\frac{dp_{s2}\left(w_{n1},w_{n2}\right)}{dw_{n2}}=0
\end{aligned}
$$

These results show that the retail price of national brand n in category c is increasing in the wholesale price of that brand, and is independent of all other wholesale prices. This result is hardly surprising given our assumption of independent categories. Also note that the retail prices for the PLs are independent of the wholesale prices of NBs.

Comparing the results of the two propositions, leads to the following interesting observation. Whereas in the NO UBS scenario, the wholesale and retail prices in one category are independent of the market potential of the NB in the other category, they are increasing (decreasing) in both NBs (PLs) market potential in the umbrella strategy scenario. By creating a link between the two categories through the use of the same name for its two products, the retailer is altering the competitive map by strategically relating the pricing of the two national brands, which are *a priori* independent. A UBS strategy allows the retailer to increase the price of its PL products, to obtain a lower wholesale price from national manufacturers and consequently to reduce the price of their brands. These observations are stated and proved in the following proposition.

Proposition 3.3 *When the retailer implements a UBS strategy, the manufacturers of national brands decrease their wholesale prices with respect to the NO UBS scenario. Further, the retailer sells at higher price its private label and at a lower price the national brands.*

Proof. See Appendix. □

The private-label literature, see, e.g., Mills (1995) and Bontems et al. (1999), showed that a PL entry in a category causes a decrease in both the wholesale and the retail prices of the national brands. The above proposition extends this result by showing that when the retailer markets several PLs, the implementation of UBS leads to a further decrease in the wholesale and the retail prices of NBs.

In terms of margins, the retailer gets higher ones on its PL, but lower ones on the national brands. Indeed, we have the following differences:

$$\begin{aligned}\left(p_{nc}^{U*} - w_{nc}^{U*}\right) - \left(p_{nc}^{N*} - w_{nc}^{N*}\right) &= -\frac{\alpha\,(1-\psi_c)\,(1-\lambda_{n3-c})}{4\,(1+\psi_c)} < 0, \quad c = 1,2,\\ p_{sc}^{U*} - p_{sc}^{N*} &= \frac{\alpha\,(1-\lambda_{n3-c})}{2\,(1+\psi_c)} > 0, \quad c = 1,2.\end{aligned}$$

Hence, choosing to market both PLs under the same name seems to be a double-facet strategy and the retailer needs to carefully trade-off between the two opposite effects above. Further, the umbrella strategy is increasing the appeal (the market potential) of the PL in both categories, which allows the retailer to enjoy higher demands for its brand with higher margins at the expenses of demand for national brands. Indeed, the sales under the two scenarios compare as follows:

$$D_{nc}^{U*} - D_{nc}^{N*} = -\frac{\alpha\,(1-\lambda_{n3-c})}{4} < 0, \qquad c = 1,2, \tag{1}$$

$$D_{sc}^{U*} - D_{sc}^{N*} = \frac{\alpha\,(2-\psi_c)\,(1-\lambda_{n3-c})}{4} > 0, \qquad c = 1,2. \tag{2}$$

What remains to be seen is how the profits of the players compare under the two strategies.

Proposition 3.4 *UBS strategy leads to lower profits for the manufacturers of national brands.*

Proof. See Appendix. □

The above result is a direct consequence of the previous ones, namely, that UBS implies lower retail prices and lower demands for NBs. Facing such outcome, the manufacturers should then attempt to find suitable counter-strategies to UBS. By returning to PLs literature, we can argue that the strategic role of private labels is to increase the bargaining power of the retailer with respect to manufacturers of national brands (see, e.g., Narasimhan and Wilcox (1998) and Morton and Zettelmeyer (2004)). Thus, retailer could use the UBS as a lever to consolidate her market power and to extract more profits from the manufacturers.

We now turn to the crucial issue of the retailer's performance. Recall that the retailer is the player who actually has the option of implementing or not an umbrella strategy. The difference in retailer's profit is given by the following long expression:

$$
\begin{aligned}
\pi_R^{U*} - \pi_R^{N*} = & -F^U + F^N + \frac{\alpha}{16\left(1+\psi_1\right)\left(1+\psi_2\right)} \times \\
& \{-\alpha\left(\lambda_{n1}\left(\psi_1+1\right)\left(3\psi_2-5\right)\left(\lambda_{n1}-2\right)+\lambda_{n2}\left(\psi_2+1\right)\left(3\psi_1-5\right)\left(\lambda_{n2}-2\right)\right) \\
& -2\tilde{w}_{s1}\left(\psi_1+1\right)\left(3\psi_1-4\right)\left(\psi_2+1\right)\left(\lambda_{n2}-1\right) \\
& -2\tilde{w}_{s2}\left(\psi_2+1\right)\left(3\psi_2-4\right)\left(\psi_1+1\right)\left(\lambda_{n1}-1\right) \\
& -2\lambda_{n1}\left(9+\psi_1+5\psi_2-3\psi_1\psi_2\right)-2\lambda_{n2}\left(9+5\psi_1+\psi_2-3\psi_1\psi_2\right) \\
& +2\left(\alpha+2\lambda_{n1}\lambda_{n2}\right)\left(5-3\psi_1\psi_2+\psi_1+\psi_2\right)+8\left(\psi_1+\psi_2+2\right)\}
\end{aligned}
\tag{3}
$$

The above expression involves all model's parameters and its sign cannot be determined analytically. Therefore, we resort to numerical analysis to get some insight on when UBS is in the best interest of the retailer. The sign of (3) is the result of the trade-offs between (i) the incremental profits realized on the sales of the private label; (ii) the savings on the fixed cost; and (iii) the losses on the NBs. Let us disregard the cost differential term, i.e., $F^N - F^U$, and focus on the other items which are more strategic in nature. Actually, if we find that the umbrella strategy is profit improving without accounting for this cost term, then there is no need to consider it. Otherwise, it will provide a lower bound for profitability of UBS.

The expression in (3) involves seven parameters, namely, the cross-price coefficients (ψ_1, ψ_2), the market potential of the national brands $(\lambda_{n1}, \lambda_{n2})$, the private label wholesale prices $(\tilde{w}_{s1}, \tilde{w}_{s2})$ and the spillover parameter α. Recall that, by construction of the model, we have the following bounds:

$$0 < \lambda_{nc} < 1, \quad 0 < \psi_c < 1, \quad 0 \le \alpha \le 1, \quad c = 1, 2.$$

Other constraints should be added to ensure non-negativity of following demand functions:

$$D_{nc}^{N*} = \frac{\lambda_{nc} + \psi_c \tilde{w}_{sc}}{4}, c = 1, 2. \tag{4}$$

$$D_{sc}^{N*} = \frac{2 + \lambda_{nc}(\psi_c - 2) - \tilde{w}_{sc}(2 - \psi_c^2)}{4}, c = 1, 2. \tag{5}$$

$$D_{nc}^{U*} = \frac{\lambda_{nc} - \alpha\left(1 - \lambda_{n3-c}\right)}{4} + \frac{\psi_c \tilde{w}_{sc}}{4}, \ c = 1, 2. \tag{6}$$

$$D_{sc}^{U*} = \frac{2 + [\lambda_{nc} - \alpha\left(1 - \lambda_{n3-c}\right)](\psi_c - 2) - \tilde{w}_{sc}(2 - \psi_c^2)}{4}, \ c = 1, 2. \tag{7}$$

It can be easily shown that the non-negativity of demands is guaranteed by the addition of the following four constraints:

$$C_{sc}^{N*} \ : \ \lambda_{nc} \le \frac{2 - \tilde{w}_{sc}(2 - \psi_c^2)}{(2 - \psi_c)}, \ c = 1, 2. \tag{8}$$

$$C_{nc}^{U*} \ : \ \lambda_{nc} \ge \alpha\left(1 - \lambda_{n3-c}\right) - \psi_c \tilde{w}_{sc}, \ c = 1, 2. \tag{9}$$

Note that condition C_{nc}^{U*} is sufficient to have an interior solution in the UBS scenario.

Our numerical simulations are conducted as follows: We fix the values of α, ψ_c and $\tilde{w}_{sc}, c = 1, 2$, and discretize the interval of admissible values of the parameters $\lambda_{nc}, c = 1, 2$, using a mesh size of 0.001. Therefore, for each vector $(\alpha, \psi_1, \psi_2, \tilde{w}_{s1}, \tilde{w}_{s2})$, we have a grid of one million points. For each point, we verify its admissibility and we compute $\pi_R^{U*} - \pi_R^{N*}$ and report its sign. By admissibility, we mean that the constraints C_{sc}^{N*} and C_{nc}^{U*} are satisfied (and, hence, the solutions are interior). We have conducted a high number of runs and all results can be generically summarized by Figure (1) drawn in the $(\lambda_{n1}, \lambda_{n2})$ −space. In this figure, we have three regions, namely, a region where the solution is not admissible (Region 1), a region where $\pi_R^{U*} - \pi_R^{N*}$ is negative (Region 2), and, finally, a region where $\pi_R^{U*} - \pi_R^{N*}$ is positive. It should be noted that the area and symmetry of each region depend on values taken by all parameters.

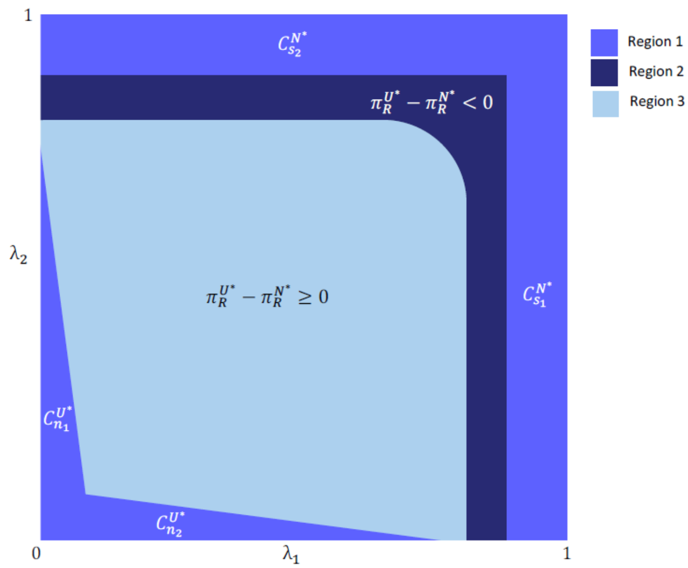

Figure 1: The sign of the difference in retailer's profit in the (λ_1, λ_2)-space

More specifically, these regions can be described as follows:

Region 1 In this region, the constraints (9) and (8) are violated, that is, at least one demand is negative.

Region 2 In this region, the UBS is not profitable for the retailer. This seems to happen when a national brand has a very high market potential in (at least) one category. In such scenario, the positive spillover created by using UBS in the second category will be low and does not allow to cover the loss in revenues on the national brands.

Region 3 In this region, the UBS is profitable for the retailer. Both PLs enjoy high enough market potentials. In this configuration, there is room for the retailer to capitalize on the positive spillover created by using UBS, i.e., the gain in the additional payoffs from the PL is higher than the loss in revenues due to lower sales (or margins) of the NBs. This provides an interesting marketing strategy implication in terms of when to use UBS. Suppose that the retailer has a successful product in one category and is contemplating the possibility of launching a new one in a different category. Based on the result, the recommendation would be to use UBS, otherwise better to go with two different names. Note that consistency in the value-offering of the brand as well as its positioning are always a prerequisite to use UBS.

Now we look into the details. Let us first concentrate on the impact of the wholesale price of PLs. Inspecting the constraints (8) and (9) shows that increasing the value of $\tilde{w}_{sc}$, leads to a larger infeasible region related to the constraint C_{sc}^{N*} (i.e., the north-east part of Region 1 becomes larger) and to a smaller infeasible region related to the constraint C_{nc}^{U*} (i.e., the south-west part of Region 1 shrinks). On the whole, increasing $\tilde{w}_{sc}$ enlarges the infeasibility region in the $(\lambda_{n1}, \lambda_{n2})$ −space. Indeed, the derivative of $\left(\pi_R^{U*} - \pi_R^{N*}\right)$ with respect to $\tilde{w}_{sc}$ is negative:

$$\frac{\partial\left(\pi_R^{U*} - \pi_R^{N*}\right)}{\partial \tilde{w}_{sc}} = \frac{-\alpha\left(3\psi_c - 4\right)\left(\lambda_{n3-c} - 1\right)}{8} < 0 \Leftrightarrow \frac{\partial \pi_R^{U*}}{\partial \tilde{w}_{sc}} < \frac{\partial \pi_R^{N*}}{\partial \tilde{w}_{sc}}. \tag{10}$$

This means that a higher wholesale price of PL, in any product category, affects the retailer's profit more significantly when she implements the umbrella strategy. This can be explained by the interdependence between the two product categories under UBS.

From now on, we fix the wholesale prices at $\tilde{w}_{sc} = 0.1$, $c = 1, 2$. Note that the PL literature has often assumed a zero value for these parameters (see, e.g., Raju et al. 1995). Here we take it positive in order (i) to account for this real cost for the retailer, and (ii) to capture its potential impact on the size of the different regions in Figure 1. Note that varying $\tilde{w}_{sc}$ showed that its impact is quantitative rather than qualitative.

To save on the number of figures without losing much qualitative insight, we focus on a setting where the two categories exhibit the same competitive structure[8], i.e., $\psi_1 = \psi_2 = \psi$. We retain three values for ψ, namely 0.1, 0.4 and 0.7. A high value means that the retailer is positioning her products close to the NBs (me-too). A low value means that the retailer and the national brand manufacturers are targeting two different market segments, e.g., low-price (generic) and premium segments.... Further, we select three values for α, namely, 0..1 (low spillover), 0.3 (moderate spillover) and 0.5 (high spillover). Figure 2 depicts the nine resulting configurations. These results call for the following observations:

1. For any given value of the spillover parameter, increasing ψ leads to a larger region where UBS is profitable. In particular, for me-too private labels (high level of ψ), UBS is an always-win strategy for the retailer. Indeed, me-too PLs benefit from: (i) the close positioning to the NBs in terms of quality, which helps them take advantage of the positive image association to the NBs that could result into more sales to PLs (Lassar et al. (1995)); and (ii) at the same time, they enjoy a positive spillover between PLs from the different categories. When the cross-price competition is low, the market potential of NBs should not exceed a certain threshold to help the retailer benefit from UBS.
2. For any given cross-price parameter ψ, increasing α has three impacts. First, the region where at least one demand becomes negative is larger, which is self explanatory based on the constraint C_{nc}^{U*}. Second, the region where UBS is detrimental to the retailer shrinks. Third, the threshold of NBs' market potential allowing the retailer to gain from the UBS, increases. Therefore, when the spillover is (expected to be) high, the manufacturers of NBs are better off competing with items that could enjoy a high market potential to combat the success of UBS. Given that an increase of the spillover has many strategic impacts, research should investigate the determinants that could boost such spillover (e.g., PL's positioning, product's characteristics, retailer's format, etc.).

To wrap up, we find that even when UBS strategy induces only positive spillovers between the categories, it may still be the case that this strategy is not profit improving for the retailer as the gain on PL's sales may not be high enough to offset the losses on NB's sales. Recall that our assessment was carried out under the assumption that UBS does not involve a cost saving for the retailer. If UBS involves a cost reduction in, e.g., merchandising or advertising, then we would expect the regions where UBS is not optimal for the retailer to shrink accordingly.

4 Conclusion

Previous research has focused on umbrella branding strategy using different approaches as experiments (see, e.g., Martinez and Pina (2003), Aaker and Keller (1992)), conjoint analysis (see e.g., Nijssen and Agustin (2005)), surveys (see e.g., Laforet (2008)), modeling at the firm level (see, e.g., Hakenes and Peitz (2008), Montgomery and Wernerfelt (1992), Degraba and Sullivan (1995)), regression analysis (see, e.g., Wang et al. (2007)) but to our knowledge no study used a game theory setting involving both the retailer and the manufacturers. Besides, few papers studied such strategy when the retailer offers NBs along with PLs. The main contribution of this paper is then to highlight the impact of choosing umbrella branding on the channel members' pricing strategies and their performances. Further, the paper explores if choosing the same brand name for PLs could be detrimental for the retailer even if there is a positive-spillover effect between both products. As pointed out above, the answer is yes in some instances.

As a first step, we provide a simple model to capture the basic interplay between channel members when umbrella strategy is chosen. This research could be extended in different directions. One can study the effectiveness of joint promotion along with the choice of umbrella strategy for private labels. Indeed, Wang et al. (2007) explained that retailers should take advantage from the positive correlation between products under the same name and maximize their profits by capitalizing on joint promotions. Also, one can consider a dynamic model where the reputation of the PL evolves over time due to investment in quality for instance.

[8] Results for any parameter values can be provided by the authors upon request.

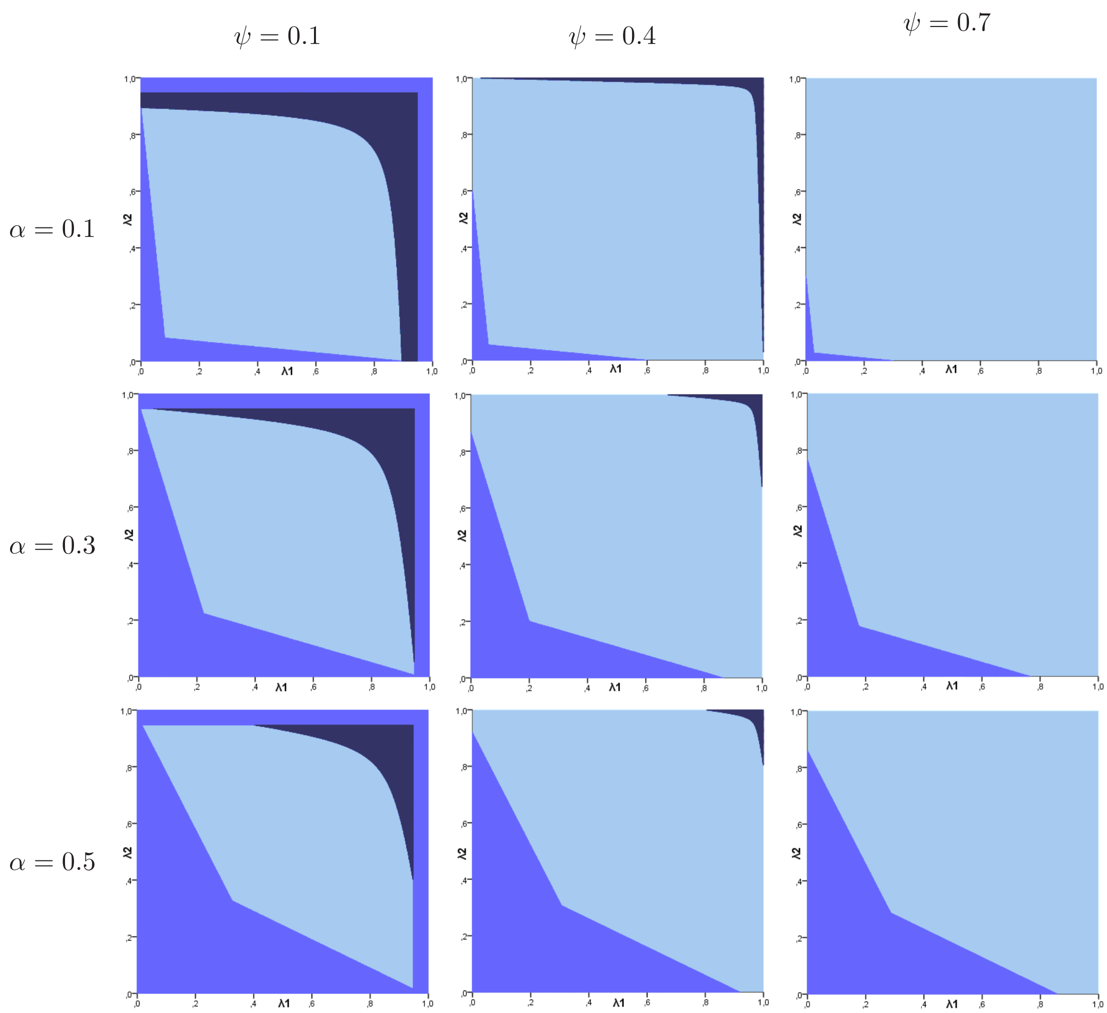

Figure 2: Results for different α and ψ

Further, it may be of interest to look at channel coordination issues when such umbrella brand is used by the retailer. Finally, given our findings that manufacturers are worse off when the retailer chooses UBS, it is then of interest to investigate what type of counterstrategy manufacturers can implement to minimize the damage done by UBS.

5 Appendix: Proofs of Proposition

Proof of Proposition 1:

Assuming an interior solution, we first determine the reaction functions of the retailer from the first-order-optimality, that is:

$$\begin{aligned}
p_{n1}^{N}\left(w_{n1}^{N},w_{n2}^{N}\right) &= \frac{1}{2\left(1-\psi_1^2\right)}\left[\lambda_{n1}\left(1-\psi_1\right)+\psi_1+w_{n1}^{N}\left(1-\psi_1^2\right)\right],\\
p_{s1}^{N}\left(w_{n1}^{N},w_{n2}^{N}\right) &= \frac{1}{2\left(1-\psi_1^2\right)}\left[-\lambda_{n1}\left(1-\psi_1\right)+1+\tilde{w}_{s1}\left(1-\psi_1^2\right)\right],\\
p_{n2}^{N}\left(w_{n1}^{N},w_{n2}^{N}\right) &= \frac{1}{2\left(1-\psi_2^2\right)}\left[\lambda_{n2}\left(1-\psi_2\right)+\psi_2+w_{n2}^{N}\left(1-\psi_2^2\right)\right],\\
p_{s2}^{N}\left(w_{n1}^{N},w_{n2}^{N}\right) &= \frac{1}{2\left(1-\psi_2^2\right)}\left[-\lambda_{n2}\left(1-\psi_2\right)+1+\tilde{w}_{s2}\left(1-\psi_2^2\right)\right].
\end{aligned}$$

Substituting in the manufacturers' problems and optimizing leads after some straightforward calculations to

$$w_{nc}^{N*}=\frac{\lambda_{nc}+\psi_c\tilde{w}_{sc}}{2},\quad c=1,2.$$

Substituting for the transfer prices in the reaction functions of the retailers give the retail prices in the Proposition. Note that all prices are strictly positive, and, therefore, the solution is indeed interior.

Proof of Proposition 2:

Assuming an interior solution, we first determine the reaction functions of the retailer from its first-order-optimality, that is:

$$\begin{aligned}
p_{n1}^{U}\left(w_{n1},w_{n2}\right) &= \frac{\left(1-\psi_1\right)\left(-\alpha\left(1-\lambda_{n2}\right)+\lambda_{n1}\right)+\psi_1+w_{n1}\left(1-\psi_1^2\right)}{2\left(1-\psi_1^2\right)},\\
p_{s1}^{U}\left(w_{n1},w_{n2}\right) &= \frac{\left(\alpha\left(1-\lambda_{n2}\right)-\lambda_{n1}\right)\left(1-\psi_1\right)+1+\tilde{w}_{s1}\left(1-\psi_1^2\right)}{2\left(1-\psi_1^2\right)},\\
p_{n2}^{U}\left(w_{n1},w_{n2}\right) &= \frac{\left(1-\psi_2\right)\left(-\alpha\left(1-\lambda_{n1}\right)+\lambda_{n2}\right)+\psi_2+w_{n2}\left(1-\psi_2^2\right)}{2\left(1-\psi_2^2\right)},\\
p_{s2}^{U}\left(w_{n1},w_{n2}\right) &= \frac{\left(\alpha\left(1-\lambda_{n1}\right)-\lambda_{n2}\right)\left(1-\psi_2\right)+1+\tilde{w}_{s2}\left(1-\psi_2^2\right)}{2\left(1-\psi_2^2\right)}.
\end{aligned}$$

Substituting in the manufacturers' problems and optimizing leads after some straightforward calculations to

$$w_{nc}^{U*}=\frac{1}{2}\left(\lambda_{nc}-\alpha\left(1-\lambda_{n3-c}\right)+\psi_c\tilde{w}_{sc}\right),\quad c=1,2.$$

Substituting for the transfer prices in the reaction functions of the retailers give the retail prices in the Proposition.

Proof of Proposition 3:

It suffices to compute the following differences to get the result.

$$\begin{aligned}
p_{nc}^{U*}-p_{nc}^{N*} &= -\frac{\alpha\left(\psi_c+3\right)\left(1-\lambda_{n3-c}\right)}{4\left(\psi_c+1\right)}<0,\quad c=1,2,\\
p_{sc}^{U*}-p_{sc}^{N*} &= \frac{\alpha\left(1-\lambda_{n3-c}\right)}{2\left(\psi_c+1\right)}>0,\quad c=1,2,\\
w_{nc}^{U*}-w_{nc}^{N*} &= -\frac{\alpha\left(1-\lambda_{n3-c}\right)}{2}<0,\quad c=1,2.
\end{aligned}$$

Proof of Proposition 4:

The differences in manufacturers' profits are given by:

$$\begin{aligned}
\pi_{M_1}^{U*} - \pi_{M_1}^{N*} &= \frac{\alpha\left(\lambda_{n2}-1\right)\left[\alpha\left(\lambda_{n2}-1\right)+2\lambda_{n1}+2\psi_1 w_{s1}\right]}{8} \leq 0, \\
\pi_{M_2}^{U*} - \pi_{M_2}^{N*} &= \frac{\alpha\left(\lambda_{n1}-1\right)\left[\alpha\left(\lambda_{n1}-1\right)+2\lambda_{n2}+2\psi_2 w_{s2}\right]}{8} \leq 0.
\end{aligned}$$

Negativity of the above two differences follows from (9),for all admissible values of $\lambda_{nc}, c = 1, 2$.

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