

# An analysis of B2B ingredient co-branding relationships <sup>☆</sup>

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## Abstract

The proliferation of co-branding in consumer markets has been given considerable attention in the literature, yet attention to the practice in business-to-business markets has been limited, despite the growing attention to the role of relationships in the B2B arena. In an examination of co-branding in the industrial sector, this paper discusses the use of ingredient co-branding and uses an econometric modeling approach to offer a rationale for why it occurs. The analysis provides insight into why downstream manufacturers participate in a relationship that strengthens the supplier's position in the market. We find that under the threat to the supplier of entry from a competitor whose costs are unobservable, co-branding relationships will be entered into resulting in a reduced probability of entry. This co-branding arrangement benefits both the incumbent supplier and the downstream manufacturer. The incumbent supplier benefits from the reduced probability of competitor entry, and the downstream manufacturer is rewarded with a lower price. Further, we find that the cost of the co-branded product is lower, due to a mitigation of double marginalization in a vertically-integrated solution. We examine co-branding relationships with and without advertising support and find that co-branding relationships with advertising support tend to be superior.

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## 1. Introduction

### 1.1. Background and overview

Co-branding is the strategy of presenting two or more independent brands jointly on the same product or service. It has been referred to by many different terms, including co-marketing, joint branding, brand alliances, and symbiotic marketing (Abratt & Motlana, 2002). Co-branding is adopted for various reasons including, to provide operational benefits, to gain the

advantage of “spill over” effects on each individual brand, and to gain a competitive advantage by increasing the attractiveness of the combined offering to the downstream customer. In a co-branding relationship between a manufacturer and a supplier specifically, the manufacturer aims to leverage the strength of both brands in the marketplace, and to profit from their individual and combined marketing efforts and brand strengths. In most cases, co-branding occurs when both brands are relatively well-established and when there is a distinctive advantage to be gained by combining the strengths of both brands.

Co-branding increasingly is becoming a major marketing strategy, as a growing number of products are sold with branded ingredients (Prince & Davies, 2002; Cooke & Ryan, 2000; Washburn, Till, & Priluck, 2004). It has been used to maximize utilization of an organization's brand assets, generate new revenues, enter new markets, create barriers to entry from competitors, share costs and risks, increase profit margins, and widen current markets (Rao & Ruekert, 1994; Park, Jun, & Shocker, 1996; American Productivity & Quality Center Report, 2001).

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Co-branding relationships are commonly categorized into four major types: ingredient co-branding, composite/complementary co-branding, licensed co-branding, and umbrella co-branding. In this paper, we primarily are interested in ingredient co-branding, i.e., the B2B relationship between the manufacturer and the supplier in which the end product of the supplier becomes one of the components of the manufacturer's offering. For example, Dell (the manufacturer) has a co-branding relationship with Intel (the supplier) in the marketing of computer servers (Intel, 2006; Wikipedia, 2006). Both manufacturer and supplier enjoy the benefits of the relationship that include mutual co-operation, shared knowledge, and risk sharing. In addition, Dell may enjoy an enhanced market reputation, while Intel may benefit by reducing the probability of entry by competitors. Dell receives a preferential price from Intel, while Intel enjoys a stable, long-term customer. Intel provides advertising support for Dell and co-branding incentives, some of which are passed on to the final customer in the form of lower prices.

In the aerospace industry, Boeing (the manufacturer) has a co-branding relationship with GE (the supplier), whose jet engines are clearly of strategic importance to Boeing (Pyke, 1998). On one hand, by highlighting its use of GE engines, Boeing potentially increases end-user trust in its airplane, consequently generating demand by airlines (the buyers). On the other hand, GE potentially increases the reputation of its product due to the fact that its engines are used by one of the world's leading airplane manufacturers. The synergism of this relationship is reinforced by support from a current GE ad. It states that GE exclusively supplies the GE90-115B engine, "the latest and world's most powerful jet engine", for Boeing's long-range 777 aircraft.

In the polycarbonate market, Data Track (the manufacturer) has a co-branding relationship in the marketing of compact discs with its supplier, Bayer's Makrolon. Makrolon, a high-tech plastic from Bayer Polymers, had approximately a thirty percent market share in the global polycarbonate market in 2002 (Bayer Annual Report, 2002). This impressive performance in the market came partly from the successful co-branding strategy started in 2000. The "Made of Makrolon®" logo helped its manufacturer partners convey the idea that the material used in their CDs and DVDs guarantees superior storage security and quality (Bayer Annual Report, 2002). In turn, this helped Bayer keep competitors at bay and build its reputation. Other examples of manufacturer-supplier co-branding relationships include Symantec (manufacturer)/US Robotics (supplier) and IBM (manufacturer)/Siebel (supplier).

The essence of B2B co-branding centers on relationships, alliances, and networks. These brand partnerships or alliances allow companies to endorse each other, engage in co-operative branding activities, and build relationships and networks that enhance themselves in the marketplace (Bengtsson & Servais, 2005). The benefits of such alliances are well-demonstrated by Bengtsson and Servais in an empirical case analysis of a co-branding alliance between two companies, DEVI and JUNKERS.

Table 1

Some major benefits of B2B ingredient co-branding

Benefit	Description of added value
Relationship benefits	Manufacturers and suppliers benefit through mutual co-operation, endorsement of each other's offering, shared knowledge and capabilities, risk sharing, trust and shared experience.
Competitive benefits	Suppliers may benefit by reducing the probability of entry of competitors. Manufacturers may enjoy a jointly enhanced market reputation.
Cost benefits	In return for the reduced probability of potential competitive entry, suppliers may reward manufacturers with a lower price. In turn, suppliers may lower costs through having a stable, long-term customer and through economies of scale.
Double-marginalization benefits	The cost of the co-branded B2B offering can potentially be lower due to the elimination of double marginalization that could result in lower prices for the customer.
Advertising support benefits	Advertising support from the supplier helps in the marketing of the product by the manufacturer. In some cases, cash-based advertising support by the supplier to the manufacturer is passed on to the buyer in the form of lower prices.

In addition to the relationship benefits highlighted by Bengtsson and Servais, some of the other benefits (see Table 1) include competitive benefits (e.g., suppliers may benefit by reducing the probability of competitive entry), cost benefits (e.g., suppliers may reward manufacturers with lower prices in return for reduced competitive entry), double-marginalization benefits (e.g., the cost of the co-branded offering can potentially be lower due to the elimination of two separate margins being passed down to the final customer), and advertising support benefits (e.g., the supplier provides advertising support to the manufacturer). Moreover, it is these relatively unique "tangible" aspects of an "ingredient" co-branding relationship between a manufacturer and a supplier that are the focus of this paper. For an understanding of B2C brand alliances, a strategy not involving joint-branding efforts as in co-branding, see Erevelles, Horton and Fukawa (2007).

### 1.2. Purpose

It is the general purpose of this paper to contribute to the limited research in the area of B2B ingredient co-branding. Specifically, the focus of the paper is to propose an analytical model to examine why ingredient co-branding relationships occur, and to examine if they are beneficial for supplier and manufacturer relationships. To clearly distinguish this paper from those that focus on consumer brands or the retail sector, the paper adopts the definition of industrial products utilized by Mudambi, Doyle, and Wong (1997), who define industrial products, "as products used in manufacturing that are not marketed (primarily) to the general consuming public. Industrial products can be process inputs, defined as products consumed in the manufacturing process (such as industrial filters and abrasives); or product inputs, products remaining as ingredients of the final product (such as bearings and coatings). Both goods and services are covered by the

definition, as are capital goods and consumable items” (p. 435). In this context, our objectives are to address the following questions:

- What are the advantages of co-branding for a manufacturer and a supplier?
- Why do manufacturers participate in a co-branding relationship that strengthens the supplier’s position?
- From the perspective of the buyer, what are the implications of co-branding on prices?
- Is a co-branding relationship that involves investments in branding, through advertising support by the supplier, superior to one that does not involve investments in branding through advertising support by the supplier?

### 1.3. Review of the literature

Co-branding is important and widespread in practice, yet few studies have investigated why co-branding relationships are actually used and how they affect market performance of the co-branding partners. Although the literature regarding branding in the B2B sector has grown considerably in recent years, relatively little work has been done in the area of co-branding. However, [van Riel, de Mortanges, and Streukens \(2005\)](#) explored the role of industrial branding in the specialty chemicals market, concluding that, just as in the consumer sector, industrial companies benefit from investing in activities to enhance their brand equity. Another article on brand equity in the B2B market ([Bendixen, Bukasa, & Abratt, 2004](#)) showed that industrial brands with high brand strength can command a price premium, but that price and delivery are more important factors than brand in explaining industrial purchase decisions. [Hutton \(1997\)](#) found that investments in branding in the B2B sector elicited brand-equity responses on the part of industrial buyers, especially those concerned about company or personal repercussions of incorrect product selection. [Mudambi \(2002\)](#), following her ([Mudambi et al., 1997](#)) call for more research into branding in the B2B sector, performed an exploratory analysis of the importance of industrial branding and identified three clusters of buyers. The three were described respectively as those that are brand receptive, those to whom brands are highly tangible, and those with low interest in branding as a decision factor. She concluded, “that branding plays a more important role in B2B decision making than has been generally recognized” (p. 531). [Michell, King, and Reast \(2001\)](#) explored the overall role of branding’s importance in the marketing of industrial products. Similar to the conclusion of [Mudambi \(2002\)](#), they concluded, “that industrial firms associate clear competitive marketing benefits with branded compared to non-branded products” (p. 424).

Interestingly, at the same time that academic interest in B2B branding is on the rise, there is practitioner evidence of the growing importance of B2B brands. To illustrate, the [Interbrand \(2005\)](#) Business Week Online listing of the 2005 top 100 global brands, with equity of at least \$1 billion each, included such well-known B2B brands as, Intel, Oracle, Xerox and Caterpillar. Nevertheless, despite the growing interest in brand strategy in the B2B sector, there had been relatively little attention devoted

to industrial co-branding in the B2B academic literature until just very recently when [Dahlstrom and Dato-on \(2004\)](#) examined the practice of co-branding of retail outlets (e.g., A&W Root Beer stores co-branding with Long John Silver’s Seafood Shoppes). That article analyzed the factors that such branded retail concept owners consider when establishing co-branding relationships with other branded retail concepts. Drawing upon inter-organizational literature, Dahlstrom and Dato-on identified potential antecedents to co-branding such as necessity and asymmetry, and developed propositions that related these antecedents to co-branding decisions.

More recently, [Bengtsson and Servais \(2005\)](#) made a noteworthy theoretical and empirical contribution to the co-branding literature. Directly addressing the issue of co-branding in industrial markets, they showed that it can be an important strategy that adds considerable value. Through the use of case studies of two Danish industrial firms, the authors showed that co-branding benefits depend on the co-branders’ relative positions in the supply chain network. In one case, it was shown that one of the co-branding firms gained a degree of credibility by its association with a stronger brand. The stronger brand, while not improving its market position, did improve its level of trustfulness in its downstream buyers. Bengtsson and Servais went on to call for additional industrial studies on co-branding in the B2B sector.

The remaining academic literature, which mostly discusses co-branding in the consumer sector, generally falls under the rubric of “brand alliances”. The major focus of these studies relates to the costs and benefits of brand alliances (e.g., [Rao & Ruekert, 1994](#)), the effectiveness of brand alliances on quality perceptions, product evaluations and consumer choice (e.g., [Rao, Qu, & Ruckert, 1999](#); [Levin & Levin, 2000](#); [Park et al., 1996](#)), the effect of brand alliances on individual brands in the alliance (e.g., [Simonin & Ruth, 1998](#)), the fit between alliance partners (e.g., [Lafferty, Goldsmith, & Hult, 2004](#)), pricing and partner selection in alliances (e.g., [Venkatesh & Mahajan, 1997](#)) and customer-based brand-equity effects (e.g., [Washburn et al., 2004](#)). The trade literature is more extensive, but lacks in-depth insight to substantially further our theoretical knowledge of the phenomena.

Nevertheless, the consumer and trade literatures do draw attention to the role of alliances and relationships in the practice of co-branding, and such relationships are certainly relevant as driving forces in B2B co-branding decisions. Indeed, [Ulaga and Eggert \(2006\)](#) note that as supply base consolidation continues, suppliers are threatened with the loss of their key supplier positions as competitors endeavor to replace them in the top spot. In response, vendors must search for effective ways to differentiate themselves from their competitors in order to retain the coveted main supplier position ([Vandenbosch & Dawar, 2002](#)). Such differentiation is consistent with the notion that maintenance of a long-term relationship requires effective responses to changes in the competitive environment ([Dwyer, Schurr, & Oh, 1987](#); [Heide, 1994](#)) and that such responses can create effective barriers to entry to those not participating in the relationship ([Wilson, 1995](#)). In this paper, we suggest that co-branding can be an effective way to create such barriers to entry

in response to a competitive threat. Indeed, reducing a competitive threat has been identified as one of the key criteria for a strategic alliance (Wakeam, 2003).

#### 1.4. Modeling B2B manufacturer–supplier co-branding relationships

Several methods of modeling the B2B buyer–seller relationship exist. One of them is the Interaction Model from the IMP group. The IMP model essentially breaks down buyer–seller relationships into three components: exchange, co-operation and adaptation (Wilson & Mummalaneni, 1986; Metcalf, Frear, & Krishnan, 1992). Its main focus is on explaining the buyer–seller relationship in B2B settings, but it does not explicitly discuss co-branding relationships. It does consider investments in the buyer–seller relationship in one of the variables, adaptation, but the type of investment is not specified. More importantly, investment is not quantified in the model. Kalafatis (2000) used the interaction model to examine the stability of relationship-building at different levels of the distribution channel. He identified three antecedents: social exchange, information exchange and product importance as determinants of inter-company co-operation. Johanson and Mattson (1985) and Turnbull, Ford, and Cunningham (1996) suggest that relationships grow through “incremental investments of resources”. Such investments are made with the belief that the other partner in the relationship will reciprocate (Turnbull et al., 1996; Turnbull & Wilson, 1989). Bengtsson and Servais (2005) specifically examine B2B co-branding relationships and how they impact the decisions and attitudes of industrial buyers. Specifically, these authors focus on the consequences and benefits of a co-branding relationship.

Our research extends this stream of work in several ways. Our paper goes beyond the IMP model on B2B buyer–seller relationships by explicitly modeling ingredient co-branding relationships. Moreover, while the IMP model does not specify or quantify investment; in our model brand name investment is modeled and quantified in the form of advertising support by the supplier. Further, we study why a co-branding relationship between a supplier and a manufacturer occurs, extending the work done on the consequences and benefits of such a relationship. We suggest that the manufacturer participates in a co-branding relationship, which strengthens the market position of the supplier. The supplier, in turn, benefits the manufacturer in a variety of ways, implying the reciprocal nature of the relationship.

This paper is an *initial foray* into understanding manufacturer–supplier ingredient co-branding relationships using an econometric modeling approach. We use a framework that draws on the work of Aghion and Bolton (1987), who develop a model to show why an incumbent seller who faces a threat of entry will sign long-term contracts that will inhibit entry of a lower-cost competitor. They consider a single incumbent supplier facing a threat of entry by a competitor and a single manufacturer. The incumbent supplier offers an exclusionary contract consisting of a wholesale price and a penalty for changing suppliers. They show that, in equilibrium, entry is deterred and total surplus is reduced.

However, our model is different from Aghion and Bolton’s model in two major respects. First, we explicitly model brand name investments in the form of advertising support by the supplier. This is an important inherent characteristic of most forms of manufacturer–supplier ingredient co-branding, and thus captures the theoretical and managerial reality of the practice. Second, we consider the implications for the end-user demand and selling price by considering the downstream demand for the co-branded product faced by the manufacturer. To our knowledge, these two issues have not explicitly been modeled in the past.

The rest of the paper is organized as follows: optimal co-branding relationships are described in the next section, which includes the overview of the model and the manufacturer’s and supplier’s problem. In the following section, we consider a co-branding relationship that also includes advertising by the supplier and examine the implications of such a relationship. Finally, we discuss our findings and the theoretical and managerial implications therein.

## 2. Optimal ingredient co-branding relationships

### 2.1. Overview of model

We are interested in co-branding relationships between manufacturers and suppliers, where two or more branded products are integrated. In an optimal co-branding relationship of this type, a supplier and manufacturer are assumed to enter into the relationship if the benefits for each of them will be greater with the relationship than without it. The demand for the product will be influenced by marketing variables such as the final selling price of the co-branded product and advertising support. In other words,

$$\beta D = -\alpha p + kA.$$

This basically means that demand is a function of price and advertising. In other words, as price increases, demand generally decreases, and as advertising increases, demand generally also increases.  $\beta$ ,  $\alpha$  and  $k$  are simple scaling parameters in the equation for demand, price and advertising respectively. With regard to the functional form for demand in the paper, when price is zero, demand is  $kA/\beta$  and demand is zero when price =  $kA/\alpha$ . Hence, if the scaling parameter beta is sufficiently small, the formulation we use provides realistic relationships between demand and price.

Both the manufacturer and the supplier have control over different aspects of demand. The manufacturer chooses a price at which the product will be sold to the downstream buyer. The supplier chooses the level of brand name investment through the level of advertising,  $A$ . Thus, the customer demand,  $D$ , for the product will depend on the selling price, chosen by the manufacturer, and the level of advertising  $A$ , or equivalently, brand name investment  $C(A)$ , chosen by the supplier and is assumed to be given by:

$$D = \frac{(-\alpha p + kA)}{\beta}, \quad (1)$$

where  $p$  is the sales price offered by the manufacturer of the co-branded product to the customer;  $A$  is the level of advertising generated through brand name investment  $C(A)$ , provided by the supplier; and  $\alpha$  and  $k$  are parameters associated with the effects of a change in price and advertising respectively on demand.

The advertising expenditure by the supplier,  $C(A)$  is assumed to be related to  $A$  as  $C(A)=A^2/2$ . In other words, there are diminishing returns to increased advertising. More specifically, the convex cost function of advertising (in conjunction with the demand function being linear in advertising) captures the diminishing marginal returns to advertising investments. This reflects the notion that with increases in advertising investments, one reaches the point where the resulting impact of advertising on demand starts to diminish. The diminishing return to increased advertising may occur for a variety of reasons including saturation in market demand, reaching a natural ceiling on brand awareness, limitations on the reach of advertising campaigns, etc.

In non-academic terms, advertising investments  $A$  can be thought to represent Gross Rating Points (GRPs). However, we need to translate these GRPs into monetary terms for use in the analytical model. Hence, we define the advertising cost function  $C(A)$ , which relates GRPs to dollars, by the following expression:  $C(A)=A^2/2$ . This assumption is quite general and standard in the literature (see e.g., Desai, 1997; Sutton, 1991). Applications of this assumption can be found in Chintagunta, Kadiyali, and Vilcassim (2006). It implies that advertising becomes increasingly costly at the margin as the advertising level in GRPs increases. The decreasing returns assumption is in line with the empirical evidence on diminishing returns to advertising reviewed in Sutton (1991).

The supplier faces the threat of entry from a competitor (entrant), whose cost,  $c_e$ , is unknown. The entrant's cost,  $c_e$ , is unobservable, but is assumed to be uniformly distributed in the interval  $[c_l, c_h]$ . In other words, contracts contingent on  $c_e$  cannot be written. The supplier's cost,  $c$ , is assumed to be  $\in [c_l, c_h]$ , with

$$c = [c_h - c_l]/2. \quad (2)$$

This simply means that when the costs of an entrant are unobservable, the incumbent supplier and the manufacturer cannot take them into consideration in the contract. For instance, if the cost of the entrant (e.g., AMD),  $c_e$ , is known, the manufacturer (e.g., Dell) and the incumbent supplier (e.g., Intel) may write a contract taking this into account. In this case, the incumbent supplier may reduce (but not necessarily eliminate) the probability of entry of a competitor by setting its wholesale price lower than that of the competitor. As the entrant's costs are unobservable, however, the incumbent supplier can estimate that the entrant's cost falls between  $c_l$  and  $c_h$ , and consequently write a contract based on this estimate.

Further, we assume that if entry occurs, then the supplier and the new entrant compete in prices, and a Bertrand equilibrium in price ensues (the Bertrand model simply reduces to the competitive equilibrium where profits are zero). We view the relationship between the supplier and the manufacturer as a contract with the following features: the supplier announces (or negotiates with the manufacturer) the wholesale price,  $w$ ; the

advertising level,  $A$ ; and a penalty,  $f$ , the per-unit penalty that the manufacturer must pay if the manufacturer does not trade with the incumbent supplier and switches to a competing entrant.

## 2.2. The relevance of price in ingredient co-branding relationships

Bengtsson and Servais (2005) rightly note that factors like reputation and image can outweigh tangible attributes with industrial buyers. However, ingredient co-branding relationships between manufacturer and supplier also involve key tangible aspects, such as the price charged by the supplier to the manufacturer. The price charged by the supplier to the manufacturer directly affects profit margins of both the supplier and the manufacturer, affects competitive and relationship dynamics for both manufacturer and supplier, and influences the price charged to the customer. Moreover, as downstream customers increasingly demand more competitive prices, the manufacturer has no other option but to carefully take price into consideration to *both* manage its profit margins and to be competitive in the marketplace.

This undoubtedly is a major reason why Dell that once had an exclusive co-branding relationship with Intel, now also uses AMD processors (del Nibletto, 2006; Domingo, 2006). Similarly, Boeing has pressured its ingredient co-branding partner, General Electric, to lower prices to effectively compete with Airbus in the marketplace and yet maintain its own margins (Cole, 1999). Moreover, as products, services and capabilities are increasingly becoming more "commoditized" at an ever faster pace in global markets, there is a constant pressure on prices (Hamel & Bernhut, 2001).

## 2.3. Supplier's problem

We model the supplier's problem as follows: The supplier maximizes its profits taking into account the behavior of the manufacturer. In other words, the supplier is the leader in a game with a "leader–follower" framework. In the first stage, the supplier declares (or negotiates) a wholesale price,  $w$  and the penalty or liquidated damages,  $f$ . The manufacturer takes these as given and decides whether to enter into the co-branding relationship or not and then chooses the sales price of the co-branded product,  $p$ . We assume that in the optimal contract,  $(w, f)$  constitute a Stackelberg equilibrium. [In a Stackelberg equilibrium, there are a limited number of firms in the marketplace. One firm (in this case, the supplier), is the leader. The leader commits to an output before other firms. The other firm (in this case, the manufacturer), is the follower. It chooses its output, so as to maximize profit, given the leader's output.] The manufacturer buys from the supplier at a wholesale price,  $w$ ; or switches incurring a penalty,  $f$ ; and buys from the competing entrant. Therefore, the entrant can sell to the manufacturer, if and only if the entrant's price satisfies the following conditions:

$$w_e = w - f \text{ and } c_e \leq w_e, \quad (3)$$

where  $w_e$  is the wholesale price offered by the entrant and  $c_e$  is its cost. The first condition is required for the entrant to sell to the manufacturer and the second condition is required for the entrant to make positive profits.

#### 2.4. Manufacturer's problem

We model the manufacturer's problem as follows: The manufacturer first evaluates whether to enter into a co-branding relationship consisting of a wholesale price,  $w$ , and penalty,  $f$ . (In a following section, we will include advertising expenditure,  $C(A)$  by the supplier in the model to reflect more realistically an actual co-branding relationship.) Following this evaluation, the manufacturer either enters into a co-branding relationship with the supplier or not. Finally, in period "2", there is a production of the "ingredient" by the supplier and the sale of the "ingredient" to the manufacturer. The manufacturer's objective is to maximize its profit. The demand depends on the manufacturer's choice of the sales price for the co-branded product.

#### 2.5. Manufacturer's profits without a co-branding relationship

We first consider the case where there is no co-branding relationship. In this case, if a new entry occurs, then the original supplier and the entrant compete in prices and prices are driven down to  $\max\{c, c_e\}$ . In other words, wholesale prices are driven down to marginal costs under Bertrand competition. Therefore, the supplier makes zero profits, while the manufacturer's profit function without a co-branding relationship, but with entry, is denoted by  $\Pi_{M,NC1}$ , (the symbols denote *manufacturer's* profit function with *no co-branding* relationship) and is given by:

$$\Pi_{M,NC1} = \frac{(p-c)(\alpha-p)}{\beta}, \quad (4)$$

where  $p$  is the sales price offered to the final buyer,  $c$  is the supplier's cost and  $\beta$  is a scaling parameter associated with demand. The demand,  $D$ , depends on the manufacturer's choice of sales price. The profit maximizing price is given by:

$$p = (\alpha + c)/2,$$

and the demand,  $D = (\alpha - c)/2\beta$ .

The manufacturer's profits thus are:

$$\Pi_{M,NC1} = \frac{(\alpha - c)^2}{4\beta}. \quad (5)$$

On the other hand, if there is no entry; the manufacturer faces monopolistic prices from the supplier. The supplier's monopolistic wholesale price is given by:

$$w_m = (\alpha + c)/2.$$

In turn, the manufacturer's profit function without a co-branding arrangement and no entry, denoted by  $\Pi_{M,NC2}$ , is given by:

$$\Pi_{M,NC2} = (p - w_m)D.$$

Substituting for  $w_m$  and solving for optimal price and quantity, we have

$$D = (\alpha - c)/\beta \text{ and } p = (3\alpha + c)/4, \text{ with}$$

$$\Pi_{M,NC2} = (p - w_m)(\alpha - p)/\beta.$$

Substituting for  $w_m$  and solving for optimal price and quantity, we have

$$q = (\alpha - c)/4\beta \text{ and}$$

$$p = (3\alpha + c)/4.$$

Therefore the manufacturer's expected profit function without a co-branding relationship, denoted by  $\Pi_{M,NC2}$ , is given by:

$$\Pi_{M,NC2} = \frac{(\alpha - c)^2}{16\beta}. \quad (6)$$

To summarize, the manufacturers expected profit when there is no co-branding relationship is given by:

$$\Pi_{M,NC} = \phi \frac{(\alpha - c)^2}{4\beta} + (1 - \phi) \frac{(\alpha - c)^2}{16\beta}, \quad (7)$$

where  $\phi$  is the probability of entry. The first term on the right represents the manufacturer's profits with entry of a second supplier and is higher since prices are driven down to Bertrand prices of  $\max\{c, c_e\}$ . The second term, representing profits when there is no entry of a second supplier, is lower since the supplier charges the monopoly price of  $w = (\alpha + c)/2$ . The probability of entry,  $\phi$  is obtained quite easily, given the distributional assumptions regarding the cost function faced by the competing entrant. Recall that if entry occurs and there is no co-branding relationship, then both suppliers compete on price and a Bertrand equilibrium in prices ensues. Thus, entry occurs only if  $c_e \leq c$  so that the probability of entry, therefore, is given by:

$$\phi = \text{Probability}(c_e \leq c) = \frac{[c - c_l]}{[c_h - c_l]}.$$

#### 2.6. Manufacturer's profits with a co-branding relationship

We now consider the manufacturer's expected profits when it has entered into a co-branding relationship with a supplier. Note that the manufacturer will switch to the new entrant only if the latter offers at least as much profit potential as does the original supplier. Without loss of generality, we assume that when the manufacturer is indifferent between "switching" versus "not-switching", the manufacturer buys from the new entrant, if in doing so its profit exceeds that if it bought from the original supplier. In the presence of a co-branding relationship consisting of a wholesale price,  $w$  and penalty,  $f$ ; the manufacturer's optimal profit, denoted by  $\Pi_{M,C}$ , is given by:

$$\Pi_{M,C} = (p - w)(\alpha - p)/\beta.$$

The profit maximizing price is given by  $p = (\alpha + w)/2$ , which in turn implies that the manufacturer's optimal profit is:

$$\Pi_{M,C} = (\alpha - w)^2/4\beta.$$

(This "optimal" profit represents the point at which returns from customer demand are maximized, given a certain wholesale price

and manufacturer sales price.) The manufacturer’s expected profits thus are given by:

$$\Pi_{M,C} = \phi' \frac{(\alpha - c)^2}{4\beta} + (1 - \phi') \frac{(\alpha - c)^2}{4\beta} \tag{8}$$

where  $\phi'$  is the probability of entry in the presence of a co-branding relationship.

2.7. Supplier's profits

The supplier’s profits without a co-branding relationship, denoted by  $\Pi_{S,NC}$ , are given by:

$$\Pi_{S,NC} = \phi \cdot 0 + (1 - \phi) \frac{(\alpha - c)^2}{4\beta}. \tag{9}$$

The first term represents the supplier’s profits when there is a new entry, and is zero, since the wholesale price is driven down to the marginal cost under Bertrand competition. The second term is the supplier’s profit when there is no new entry. The supplier’s profits in the presence of a co-branding relationship are given by:

$$\Pi_{S,C} = \phi' f \frac{(\alpha - w)}{2\beta} + (1 - \phi') \frac{(\alpha - w)(w - c)}{2\beta} \tag{10}$$

where  $\phi'$  is the probability of entry with a co-branding relationship. The above optimization problem is subject to the manufacturer’s individual rationality constraint. This is given by:

$$\phi' \frac{(\alpha - w)^2}{4\beta} + (1 - \phi') \frac{(\alpha - w)^2}{4\beta} \geq \phi \frac{(\alpha - c)^2}{4\beta} + (1 - \phi) \frac{(\alpha - c)^2}{16\beta}. \tag{11}$$

The individual rationality constraint of the manufacturer ensures that the manufacturer is better off, with the co-branding relationship than without the co-branding relationship. We now proceed as follows: First, we will characterize the nature of the optimal co-branding relationship, consisting of a wholesale price  $w$  and penalty  $f$ . We formulate the Lagrangian after expressing the constraints in less-than-or-equal-to form. The Lagrangian for this optimization problem is given by:

$$L = \phi' \frac{(\alpha - w)f}{2\beta} + (1 - \phi') \frac{(w - c)(\alpha - w)}{2\beta} - \frac{\lambda(\alpha - w)^2}{4\beta}. \tag{12}$$

The preceding maximization problem can be solved by invoking the Kuhn–Tucker conditions for the Lagrangian. We now present our propositions.

3. Propositions

As suggested earlier, the benefits of ingredient co-branding between supplier and manufacturer are many (see Table 1). It has been suggested that the profits of an accommodating incumbent seller increase, even if the seller offers a lower-than-market price to the manufacturer, if competition is pre-empted though an

alliance or relationship (Arbatskaya, 2001). The supplier enjoys “relationship benefits” derived through mutual co-operation (Abratt & Motlana, 2002), endorsement of each other’s offerings, shared knowledge capabilities, risk sharing, shared capabilities, etc., “competitive benefits” by reducing the probability of entry by competitors (Hallen, Johanson, & Seyed-Mohamed, 1991; Wilson, 1995; Wakeam, 2003; Ulaga & Eggert, 2006), and “cost benefits” by lowering costs through having a stable, long-term customer, and through economies of scale, which translate into profits (Kanter, 1994). Consequently, and based on our discussion in earlier sections, we propose the following:

**Proposition 1.** *The supplier's profits are higher with a co-branding relationship than without a co-branding relationship, i.e., a unique optimal co-branding solution exists such that the optimal wholesale price  $w^*$  and the optimal penalty  $f^*$  for the co-branding relationship are given by:*

$$w^* = \frac{(\alpha - (\alpha - c)(1 + 3\phi)^{1/2})}{2} \tag{13}$$

$$f^* = w^* - \frac{c}{2} - \frac{c_l}{2}. \tag{14}$$

**Proof.** The Lagrangian for this optimization problem is given by:

$$L = \frac{\phi'(\alpha - w)f}{2\beta} + (1 - \phi') \frac{(w - c)(\alpha - w)}{2\beta} - \frac{\lambda(\alpha - w)^2}{4\beta}.$$

This optimization problem is solved by invoking the Kuhn–Tucker conditions:

$$\frac{\partial L}{\partial w} \leq 0, \frac{\partial L}{\partial f} \leq 0, w \frac{\partial L}{\partial w} = 0, f \frac{\partial L}{\partial f} = 0, \frac{\partial L}{\partial \lambda} \geq 0, \lambda \frac{(\alpha - w)^2}{4\beta} = 0, \lambda \geq 0.$$

Substituting for

$$\phi' = \frac{[w - f - c_l]}{[c_h - c_l]}$$

and solving the preceding equations we find that  $\lambda > 0$  and hence the constraint is binding. The constraint then yields

$$(\alpha - w)^2 = (\alpha - c)^2 \frac{(1 + 3\phi)}{4}.$$

Solving the above and the first-order conditions for  $w$  and  $f$  we get,

$$w^* = \frac{(\alpha - (\alpha - c)(1 + 3\phi)^{1/2})}{2}$$

$$f^* = w^* - c/2 - c_l/2.$$

These conditions satisfy the necessary and sufficient conditions for a maximum. Therefore the pair  $\{w^*, f^*\}$  is the unique optimal solution. Hence Proposition 1.

*Discussion:* Proposition 1 provides the conditions for an interior solution consisting of a non-zero wholesale price  $w^*$  and a non-zero penalty  $f^*$ . Proposition 1 shows that, in the optimal contract, the supplier finds it ideal to use both the wholesale

price  $w^*$  and the penalty  $f^*$ . In other words, the supplier’s profits are higher with a co-branding relationship than without a co-branding relationship. Thus, the supplier is better off with the co-branding relationship, while the manufacturer is no worse off, since its individual rationality constraint is also satisfied. Further, the incumbent supplier exploits the manufacturer’s uncertainty regarding the competing entrant’s cost. By entering into such a relationship, the supplier becomes less vulnerable to the threat of entry from a competitor and rewards the manufacturer with a lower wholesale price. The manufacturer, on the other hand, is left at the reservation surplus since the “individual rationality” constraint holds as an equality at the optimum. We now provide some descriptive statistics that characterize the optimal contract.

First, the probability of entry with a co-branding relationship is lower than the probability of entry in the absence of a co-branding relationship. This is fairly easy to see since  $\phi' = \text{Probability}(c_e \leq w^* - f^*) = (c - c_l) / 2(c_h - c_l)$  from Eq. (14) and  $\phi = (c - c_l) / (c_h - c_l)$ . Hence  $\phi' < \phi$ . The entrant has to set a price sufficiently low to be able to get the manufacturer to switch from the incumbent supplier. Thus, only an entrant with cost  $c_e \leq w - f$  finds it profitable to enter the market. Thus, while the likelihood of entry is reduced, it is not completely eliminated.

Second, as the likelihood that the new entrant has higher cost increases: the incumbent supplier’s profit increases since the supplier is able to charge a higher wholesale price. This can be seen by differentiating the optimal wholesale price  $w^*$  with respect to  $c_h$ .

Recall that  $w^*$  is given by:

$$w^* = \frac{(\alpha - (\alpha - c)(1 + 3\phi)^{1/2})}{2} \tag{15}$$

$$\frac{dw^*}{dc_h} = \frac{3(\alpha - c)(c - c_l)}{4(1 + 3\phi)^{1/2}(c_h - c_l)^2} + \frac{(1 + 3\phi)^{1/2}}{4} \tag{16}$$

Hence  $dw^*/dc_h > 0$ . Thus, the optimal wholesale price and the incumbent supplier’s profits increase, as the likelihood that the new entrant is a high cost supplier increases.

Like the supplier, the manufacturer also enjoys “relationship benefits” such as mutual co-operation, shared knowledge and risk sharing (Abratt & Motlana, 2002). In addition, the manufacturer enjoys “cost benefits” from suppliers who reward manufacturers with a lower price in return for reduced probability of potential competitive entry (Wakeam, 2003; Wilson, 1995). There is considerable evidence (e.g., Aghion & Bolton, 1987; Bork, 1978; Posner, 1976) that manufacturers tend to reject exclusive strategic alliances (such as co-branding relationships) that reduce the likelihood of entry by competing suppliers, unless the seller compensates the manufacturer with an “advantageous deal”. This “advantageous deal” could result in higher potential manufacturer margins. The optimal manufacturer sales price thus moves lower to make the manufacturer more competitive in the marketplace. In addition, the potential for elimination of double-marginalization effects, where both the supplier and the manufacturer have independent margins which

are passed on to the buyer, is increased. The conventional wisdom about double marginalization is that the integrated entity “makes more profit” than the non-integrated entity and the customer “price is lower” for the integrated entity (Tirole, 1988, p175; Hamilton & Mqasqas, 1996). Consequently, we propose the following.

**Proposition 2.** *The optimal manufacturer sales price is lower with a co-branding relationship than without a co-branding relationship.*

**Proof.** By contradiction. Recall that the optimal sales price with co-branding is given by  $p = (\alpha + w^*)/2$ . Substituting for  $w^*$  from Eq. (15), the optimal manufacturer sales price with co-branding,

$$p_C = \frac{(\alpha - (\alpha - c)(1 + 3\phi)^{1/2})}{4} \tag{17}$$

Without the co-branding relationship, the sales price is given by:

$$p_N = \frac{2\phi(\alpha + c)}{4} + \frac{(1 - \phi)(3\alpha + c)}{4} \tag{18}$$

If  $p_N < p_C$ , substituting for  $p_N$  and  $p_C$ , we get:

$$(1 + \phi) > (1 + 3\phi)^{1/2}$$

which, in turn implies that

$$\phi(\phi - 1) > 0.$$

This is not true since  $0 \leq \phi \leq 1$ . Hence  $p_C < p_N$ . We could interpret this to mean that the co-branding relationship mitigates the double-marginalization effect on the manufacturer’s price. In other words, the supplier’s choice of wholesale price with a co-branding relationship is similar to the choice in a vertically-integrated system. Therefore, co-branding relationships enable the upstream supplier to control the downstream choice of sales price by the manufacturer and hence channel coordination is achieved.

#### 4. A model of co-branding with advertising support

Another relatively unique aspect of “ingredient co-branding” as compared with other forms of co-branding is that the supplier often provides advertising support during the marketing of the manufacturer’s offerings. While advertising may not be the most important communication tool in all B2B contexts, it often is particularly relevant in ingredient co-branding relationships. To illustrate the role of advertising in ingredient co-branding, Intel, through prior agreement, pays half the advertising costs for any advertisement that prominently displays the “Intel Inside” logo, provided the advertisement does not contain any reference to a competitor (Wikipedia, 2006). Moreover, Intel has had a long running “co-operative marketing” program with manufacturers, whose flagship “co-op advertising program”

stresses their “cutting-edge ingredient branding program” that reimburses manufacturers for advertisements involving ingredient co-branding with Intel (Intel, 2006). Consequently, a model of co-branding with advertising support may better capture the institutional reality of ingredient co-branding relationships. We therefore, next consider a co-branding relationship where the supplier specifies an advertising support expenditure,  $C(A)$ , in addition to specifying the wholesale price  $w$  and the penalty  $f$ .

It should also be noted that, in general, B2B advertising expenditures are increasing as B2B marketers seek to offset the rising costs of direct sales calls, recently averaging around \$329 per call (Cahners Research, 2002). Moreover, per call sale costs understate the actual expense of direct sales since several face-to-face visits are normally required to complete a sale. These costs are in sharp comparison to the cost of \$0.24 per recipient, for example, in a specialized business magazine advertisement (Cahners Research, 2002). Perhaps this is why B2B marketers are shifting more and more promotional dollars to advertising (Maddox, 2004, 2005). Indeed, the top 100 B2B advertisers spent an estimated \$6.7 billion combined on B2B advertising in 2004, up 12.25% over 2003. In addition, B2B advertising on the Internet increased by 66% in 2004 (Maddox, 2005). The increasing usage of media and other forms of advertising to reach B2B target markets is consistent with the changing paradigm of industrial marketing, where new models are replacing more traditional models (Sharma & LaPlaca, 2005), and causing marketers to rethink how they approach buyers. The result has been a trend away from traditional B2B marketing practices to “unconventional” advertising platforms and other electronic means of direct advertising (Wind, 2006).

4.1. *Manufacturer's problem with advertising support*

As in the previous proposition, the manufacturer first evaluates whether to enter into the co-branding contract, consisting of a wholesale price,  $w$ , penalty,  $f$ , and, in addition, an advertising support expenditure,  $C(A)$  by the supplier. Then, depending on the evaluation, it enters into the co-branding relationship, or not. In period 2, there is production of the component by the supplier, the supplier incurs an advertising support expenditure,  $C(A)$ , and there is the sale of the component. Let us assume that the manufacturer’s objective is to maximize its profit. The demand for the co-branded product depends on the manufacturer’s choice of sales price,  $p$ , and advertising support level,  $A$ , generated through the advertising expenditure  $C(A)$  by the supplier. (We assume that the manufacturer’s own advertising expenditure is constant, whether or not it enters into a co-branding relationship, or whether or not the co-branding relationship includes advertising support by the supplier.)

4.2. *Supplier's problem with advertising support*

We model the supplier’s problem as follows: In the first stage, the supplier declares a wholesale price,  $w$ , the penalty or liquidated damages,  $f$ , and advertising support expenditure,  $C(A)$  in brand name investments. The manufacturer takes these as

given and decides whether to enter into the co-branding relationship or not and then chooses the sales price,  $p$ . Given that the supplier is the leader in a leader–follower game, the first stage choices of  $(w, f, C(A))$  constitute a Stackelberg equilibrium. The manufacturer either buys from the supplier at a wholesale price of  $w$ , or switches and buys from the entrant, paying a penalty of  $f$ . The entrant can sell to the manufacturer if and only if the entrant’s price satisfies the following conditions:

$$w_e \leq w - f - kA \text{ and } w_e \leq c_e.$$

The first condition is required for the entrant to sell to the manufacturer and the second condition is required for the entrant to make positive profits.

4.3. *Manufacturer's profits without a co-branding relationship*

The manufacturer’s profits without a co-branding relationship are identical to that in an earlier section of this paper, as the issue of advertising support by the supplier is irrelevant. It is therefore given by Eq. (7) as:

$$\Pi_{M,NC} = \frac{\phi(\alpha - c)^2}{4\beta} + (1 - \phi)\frac{(\alpha - c)^2}{16\beta}.$$

4.4. *Supplier's profits with and without a co-branding relationship with advertising support*

As before, the supplier’s profits without a co-branding relationship are given by:

$$\Pi_{S,NC} = \phi \cdot 0 + (1 - \phi)\frac{(\alpha - c)^2}{4\beta}.$$

The first term represents the supplier’s profits when there is entry and is zero since the wholesale price is driven down to marginal cost under Bertrand competition. The second term is the supplier’s profit when there is no entry and represents the monopolistic profits accruing to the supplier, whose profits in the presence of a co-branding relationship with advertising support are given by:

$$\begin{aligned} \Pi_{S,C} = & \phi' \frac{f(\alpha - w + kA)}{2\beta} + (1 - \phi') \frac{(\alpha - w + kA)(w - c)}{2\beta} \\ & - (1 - \phi') \frac{A^2}{2} \end{aligned} \tag{19}$$

subject to

$$\begin{aligned} \phi' \frac{(\alpha - w + kA)^2}{4\beta} + (1 - \phi') \frac{(\alpha - w + kA)^2}{4\beta} \geq & \frac{\phi(\alpha - c)^2}{4\beta} \\ & + (1 - \phi) \frac{(\alpha - c)^2}{16\beta}. \end{aligned} \tag{20}$$

As before,  $\phi'$  denotes the probability of competitive entry with a co-branding relationship. As in the previous section, Eq. (20)

represents the “individual rationality” constraint of the manufacturer that guarantees that the manufacturer is better off, in an expected sense, with a co-branding relationship, than without. The Lagrangian for the above problem can be written as:

$$L = \phi' \frac{(\alpha - w + kA)f}{2\beta} + (1 - \phi') \frac{(w - c)(\alpha - w + kA)}{2\beta} - \frac{(1 - \phi')A^2}{2} - \frac{\lambda(\alpha - w + kA)^2}{4\beta}. \tag{21}$$

As before, the preceding maximization problem can be solved by invoking the Kuhn–Tucker conditions for the Lagrangian.

A co-branding relationship with advertising support offers several advantages. In addition to mutual co-operation, advertising support by the supplier also underscores the endorsement of each others offerings by the manufacturer and the supplier (Park et al., 1996). Hutton (1997) suggests that such “investments” elicit significant “brand-equity behaviors”. In addition, a co-branding relationship with a reputable supplier enhances the reputation of the manufacturer’s final product (Simonin & Ruth, 1998). In recent years, interactive marketing support by suppliers is rapidly growing in B2B sectors (Barwise & Farley, 2005), and this further supports the co-branded product. Advertising support from the supplier helps in the marketing of the product by the manufacturer. In the case of “cash-based advertising support” (such as when Intel pays a fee to Dell to place the “Intel Inside” label on its products), the fee often is passed on the customer through lower prices. Consequently, and based on our discussion in earlier sections, we propose the following.

**Proposition 3.** *A co-branding relationship which specifies a wholesale price,  $w$ ; advertising support expenditure,  $C(A^*)$  and penalty,  $f^*$  dominates one which only specifies a wholesale price  $w^*$  and a penalty  $f^*$ . (A co-branding relationship with advertising support dominates one without advertising support.)*

The optimal wholesale price  $w^*$ , advertising support  $A^*$  and penalty  $f^*$  for the co-branding relationship are given by:

$$C(A^*) = \frac{(\alpha - c)^2 k^2 (1 + 3\phi)}{32\beta^2} \tag{22}$$

$$w^* = \alpha + \frac{(k - 2\beta)(\alpha - c)k(1 + 3\phi)^{1/2}}{k} \tag{23}$$

$$f^* = w^* - \frac{c}{2} - \frac{c_l}{2} - \frac{3k^2(\alpha - c)(1 + 3\phi)^{1/2}}{16\beta}. \tag{24}$$

**Proof.** The Lagrangian for this optimization problem is given by:

$$L = \frac{\phi'(\alpha - w + kA)f}{2\beta} + (1 - \phi') \frac{(w - c)(\alpha - w + kA)}{2\beta} - (1 - \phi') \frac{A^2 \lambda (\alpha - w + kA)^2}{4\beta} - (1 - \phi') \frac{A^2}{2}.$$

This optimization problem is solved by invoking the Kuhn–Tucker conditions:

$$\begin{aligned} \frac{\partial L}{\partial w} \leq 0, \frac{\partial L}{\partial f} \leq 0, \frac{\partial L}{\partial A} \leq 0, w \frac{\partial L}{\partial w} = 0, f \frac{\partial L}{\partial f} = 0, A \frac{\partial L}{\partial A} = 0, \frac{\partial L}{\partial \lambda} \geq 0, \\ \lambda \times \frac{(\alpha - w + kA)^2}{4\beta} = 0, \lambda \geq 0. \end{aligned}$$

Solving the first-order conditions for  $w, f,$  and  $A$  and with algebraic manipulation we get

$$\begin{aligned} C(A^*) &= \frac{(\alpha - c)^2 k^2 (1 + 3\phi)}{32\beta^2} \\ w^* &= \alpha + \frac{(k - 2\beta)(\alpha - c)k(1 + 3\phi)^{1/2}}{k} \\ f^* &= w^* - \frac{c}{2} - \frac{c_l}{2} - \frac{3k^2(\alpha - c)(1 + 3\phi)^{1/2}}{16\beta}. \end{aligned}$$

These conditions satisfy the necessary and sufficient conditions for a maximum. Therefore  $\{w^*, f^*, A^*\}$  is the unique optimal solution. Hence Proposition 3.

*Discussion:* Proposition 3 provides the optimal wholesale price,  $w$ , penalty,  $f$  and advertising support,  $A$ . Note that the supplier obtains revenues from the manufacturer through the wholesale price,  $w$  and advertising,  $C(A)$ . As seen in the previous section, the wholesale price,  $w$  is a sufficient instrument for the supplier. But if the advertising support sensitivity parameter,  $k$ , is sufficiently high, the supplier finds it optimal to use both the wholesale price  $w$ , as well as the advertising support investment,  $C(A)$ . The intuition is that advertising by the manufacturer shifts the demand curve, and hence a co-branding relationship specifying a wholesale price,  $w^*$ , and a penalty,  $f^*$  can be improved upon by additionally specifying an advertising support investment in the contract. We should point out that our results are consistent with the observed co-branding relationships between suppliers facing entry and manufacturers.

### 5. Discussion and managerial implications

Our findings highlight several potential benefits of ingredient co-branding relationships. Our analysis suggests that participating suppliers and manufacturers both benefit from the relationship, as does the downstream buyer. The supplier’s profits are higher with the co-branding relationship than without it. In return for the barriers to entry created for competing suppliers, the supplier rewards the manufacturer with lower prices. Some of these rewards are passed down-channel to the final buyer, which in turn benefits the manufacturer in the marketplace. The customer benefits due to the mitigation of double marginalization and obtains lower prices and wider expertise. It should be noted, however, that due to the unique marketing benefits associated with the combination of two brands, an ingredient co-branding relationship is very different from a vertically-integrated system. However, as noted previously, co-branding relationships between manufacturers and suppliers share some of the advantages and disadvantages associated with strategic alliances. One of the advantages for suppliers in an ingredient

co-branding relationship is the barrier to entry created from current or potential competitors (Hallen et al., 1991; Wilson, 1995). This is especially important in today's hyper-competitive supply chain environment where suppliers from any part of the world are able to compete effectively based on price or quality (Vandenbosch & Dawar, 2002).

In Proposition 1, two important aspects of the ingredient co-branding relationship were discussed. First, it was suggested that with an ingredient co-branding relationship, the probability of entry by a competing supplier is lower than the probability of entry in the absence of an ingredient co-branding relationship. Second, it was suggested that as the likelihood increases that the competing entrant outside the co-branding relationship has a higher cost, the incumbent supplier's profits also increase. In Proposition 2, it was suggested that an ingredient co-branding relationship eases the double-marginalization effect on the manufacturer's price, which may lead to a lower manufacturer's sales price. Also, the possibility that a firm can achieve better channel coordination with an ingredient co-branding relationship was suggested. In Proposition 3, we suggest that advertising support by the supplier to the manufacturer shifts the demand curve. The presence of these shifts suggests that the ingredient co-branding relationship is made superior by additionally specifying an advertising support investment in the co-branding contract.

We will now further discuss some of the implications of our findings. The manufacturer and supplier can enter into a co-branding relationship, whether or not a competing supplier (entrant) exists. It can reasonably be assumed that when a competing entrant exists, the manufacturer stands to benefit, as prices are driven down when the incumbent supplier and entrant compete for the manufacturer's business. The manufacturer, thus, would earn a higher profit. The situation changes, however, when there is no competing entrant. The supplier has the opportunity to charge monopolistic prices, and the manufacturer's profits are correspondingly driven down. In pricing decisions for the product, the supplier is the leader and the manufacturer is the follower, and the downstream price charged by the manufacturer is influenced by the wholesale price charged by the supplier. The manufacturer's earnings are thus higher when there is an entrant and lower when there is no entrant.

When a co-branding relationship exists between manufacturer and supplier, the manufacturer's price is still driven by the supplier's price. The manufacturer, however, benefits from the brand strength of the supplier, which increases the marketability of the product. In addition, the manufacturer enjoys the continuous supply of a usually superior component of its product. Finally, the manufacturer is rewarded with a lower price by the supplier, in return for a reduction in the threat to the supplier of entry from a competing supplier. The manufacturer's earnings are thus likely to be higher with a co-branding relationship.

## 6. Conclusions and limitations

B2B ingredient co-branding relationships are increasingly being used as a viable marketing strategy. Despite this, there is

relatively little research that addresses B2B ingredient co-branding relationships and outcomes. This paper is an initial examination of these relationships between manufacturers and suppliers. We used an econometric modeling approach to explain why manufacturers and suppliers engage in co-branding relationships. In the process, we provide some answers for why downstream manufacturers participate in a relationship that may strengthen the supplier's position in the marketplace. We find that when faced with the threat of entry from a competitor whose costs are unobservable, suppliers enter into co-branding relationships with manufacturers that result in a reduced probability of entry of the competitor. In return for this reduced probability of entry of its competitors, the supplier rewards the manufacturer with a lower price in the co-branding relationship. We also find that due to the mitigation of double marginalization; the cost of the co-branded product can potentially be lower, resulting in a possible benefit to the downstream customer. Thus, co-branding relationships involving a contracted-upon wholesale price and penalty for switching results in a quasi-vertically-integrated outcome, that may enhance channel coordination. We also find that co-branding relationships with advertising support are superior to those without advertising support.

This paper makes several contributions to the extant literature. First, it provides a theoretical and managerial reason for the rationale behind ingredient co-branding relationships. An examination of past literature reveals that this basic justification for co-branding has never been substantiated. This paper thus lays a foundation for further development of both theory and practice in the area. Second, this paper provides an explanation for the seemingly counter-intuitive phenomena in which manufacturers participate in co-branding relationships that strengthen the supplier's position in the marketplace. It appears that they do so because it could potentially increase both their demand and profit margins. Third, we propose that from the perspective of the downstream customer, co-branding may actually serve to reduce prices. While once again, this may seem to be a counter-intuitive notion, we suggest that it is not, and offer that the elimination of double marginalization in the channel may serve to reduce prices. Fourth, we provide theoretical support for the idea that co-branding relationships with brand investment (advertising support) by the supplier are superior to those without brand investment. This is an important initial contribution, as it represents the reality in most co-branding relationships, and to the best of our knowledge, has not been modeled before. Fifth, most of the extant academic literature on co-branding has concentrated on co-branding in consumer markets. Our paper is one of the few that has examined ingredient co-branding relationships in a B2B context. Sixth, our conclusions seem to lend further support to the move away from "transactional" relationships in channels to closer and more permanent "transvectional" relationships (see Erevelles & Stevenson, 2006; Alderson & Martin, 1965).

Our contribution should not, however, be overstated. Our model represents an initial foray into the realm of B2B co-branding relationships. Co-branding relationships in the B2B marketplace are varied and complex. It is unclear from our

discussion, for example, how our conclusions would be different if the manufacturer has considerably more “market power” and brand strength than the supplier. Similarly, it is unclear what would happen if a competitive entrant (supplier) has a vastly superior product or a new disruptive technology that in effect renders the incumbent supplier obsolete. Clearly, research is needed to further clarify such issues and better study the phenomena from different angles.

## References

- Abratt, R., & Motlana, P. (2002, September). Managing co-branding strategies: Global brands into local markets. *Business Horizons*, 45, 43–55.
- Aghion, P., & Bolton, P. (1987). Contracts as a barrier to entry. *American Economic Review*, 77(3), 388–401.
- Alderson, W., & Martin, M. W. (1965). Toward a formal theory of transactions and transfections. *Journal of Marketing Research*, 2(2), 117–127.
- American Productivity & Quality Center Report. (2001). B to B branding: Building a brand powerhouse. *APQC Report* (pp. 53). Chap. 3.
- Arbatskaya, M. (2001). Can low-price guarantees deter entry? *International Journal of Industrial Organization*, 19(9), 1387–1406.
- Barwise, P., & Farley, J. (2005). The state of interactive marketing in seven countries: Interactive marketing comes of age. *Journal of Interactive Marketing*, 19(3), 67–80.
- Bayer Annual Report. (2002). *50 Years of MakrolonR: a timeless invention*. <http://www.bayer.com/annualreport2002>, Retrieved November 2006.
- Bengtsson, A., & Servais, P. (2005). Co-branding on industrial markets. *Industrial Marketing Management*, 34(7), 706–713.
- Bendixen, M., Bukasa, K. A., & Abratt, R. (2004). Brand equity in the business-to-business market. *Industrial Marketing Management*, 33(5), 371–380.
- Bork, R. H. (1978). *The Antitrust Paradox*. New York: Basic Books.
- Cahners Research. (2002). Evaluating the cost of sales calls in business-to-business markets. *Cahners Business Information*, January, 5 (pp. 11).
- Chintagunta, P., Kadiyali, V., & Vilcassim, N. (2006). Endogeneity and simultaneity in competitive pricing and advertising: A logit demand analysis. *Journal of Business*, 79(6), 2761–2787.
- Cole, J. (1999). Airbus Industrie charges Boeing is inciting price war in Asian deal. *Wall Street Journal-Eastern Edition*, 233(119), A4.
- Cooke, S., & Ryan, P. (2000). Brand alliances: From reputation to collaboration on core competencies. *Irish Marketing Review*, 13(2), 36–41.
- Dahlstrom, R., & Dato-on, M. C. (2004). Business-to-business antecedents to retail co-branding. *Journal of Business-to-Business Marketing*, 11(3), 1–22.
- del Nibletto, P. (2006). Will Dell ask AMD to dance? *Computer Dealer News*, 22(3), 16.
- Domingo, J. S. (2006). Dell's first AMD system. *PC Magazine*, 25(22), 34.
- Desai, P. S. (1997). Advertising fee in business-format franchising. *Management Science*, 43(10), 1401–1419.
- Dwyer, F. R., Schurr, P. H., & Oh, S. (1987). Developing buyer–seller relationships. *Journal of Marketing*, 51(2), 11–27.
- Erevelles, S., & Stevenson, T. H. (2006). Enhancing the business-to-business supply chain: Insights from partitioning the supply-side. *Industrial Marketing Management*, 35(4), 481–492.
- Erevelles, S., Horton, V., & Fukawa, N. (2007). Understanding B2C Brand Alliances between Manufacturers and Suppliers. Unpublished paper, forthcoming, *Marketing Management Journal*.
- Hallen, L., Johanson, J., & Seyed-Mohamed, N. (1991). Interfirm adaptation in business relationships. *Journal of Marketing*, 55(2), 29–37.
- Hamel, G., & Bernhut, S. (2001, July/August). Leading the revolution. *Ivey Business Journal*, 37–43.
- Hamilton, J., & Mqasqas, I. (1996). Double marginalization and vertical integration: New lessons from extensions of the classic case. *Southern Economic Journal*, 62(3), 567–584.
- Heide, J. B. (1994). Interorganizational governance in marketing channels. *Journal of Marketing*, 58(1), 71–85.
- Hutton, J. G. (1997). A study of brand equity in an organizational-buying context. *Journal of Product & Brand Management*, 6(6), 428–439.
- Intel. (2006). *Learn more about cooperative marketing*. Corporate Website, [http://intelinside.intel.com/learn\\_more.htm](http://intelinside.intel.com/learn_more.htm), Retrieved December 5, 2006.
- Interbrand. (2005). *Top 100 global brands scoreboard*. *Business Week Online*. <http://bwnt.businessweek.com/brand/2005/>, Retrieved February 2005.
- Johanson, J., & Mattson, L. G. (1985). Marketing investments and market investments in industrial networks. *International Journal of Research in Marketing*, 2(3), 185–195.
- Kalafatis, S. (2000). Buyer–seller relationships along channels of distribution. *Industrial Marketing Management*, 31(3), 215–228.
- Kanter, R. M. (1994). Collaborative advantage: The art of alliances. *Harvard Business Review*, 72(4), 96–108.
- Lafferty, B. A., Goldsmith, R. E., & Hult, T. M. (2004). The impact of the alliance on the partners: A look at cause-brand alliances. *Psychology & Marketing*, 21(7), 509–531.
- Levin, I. P., & Levin, A. M. (2000). Modeling the role of brand alliances in the assimilation of product evaluations. *Journal of Consumer Psychology*, 9(1), 43–52.
- Maddox, K. (2004). New marketing index to benchmark spending. *BB*, 89(3), 4.
- Maddox, K. (2005). Top b-to-b advertisers. *BB*, 90(110), 25–26.
- Metcalfe, L., Frear, C., & Krishnan, R. (1992). Buyer–seller relationships: An application of the IMP interaction model. *European Journal of Marketing*, 26(2), 27–46.
- Michell, P., King, J., & Reast, J. (2001). Brand values related to industrial products. *Industrial Marketing Management*, 30(5), 415–425.
- Mudambi, S. M. (2002). Branding importance in business-to-business markets: Three buyer clusters. *Industrial Marketing Management*, 31(6), 525–533.
- Mudambi, S. M., Doyle, P., & Wong, V. (1997). An exploration of branding in industrial markets. *Industrial Marketing Management*, 26(5), 433–446.
- Park, C. W., Jun, S. Y., & Shocker, A. D. (1996). Composite branding alliances: An investigation of extension and feedback effects. *Journal of Marketing Research*, 33(4), 453–466.
- Posner, R. A. (1976). *Antitrust law: economic perspective*. Chicago: University of Chicago Press.
- Prince, M., & Davies, M. (2002, September). Co-branding partners: What do they see in each other? *Business Horizons*, 45, 43–55.
- Pyke, D. F. (1998, February). Strategies for global sourcing. *The Financial Times*, 20, 2–4.
- Rao, A. R., & Ruckert, R. W. (1994). Brand alliances as signals of product quality. *Sloan Management Review*, 36(1), 87–97.
- Rao, A. R., Qu, L., & Ruckert, R. W. (1999). Signaling unobservable product quality through a brand ally. *Journal of Marketing Research*, 36(2), 258–268.
- Sharma, A., & LaPlaca, P. (2005). Marketing in an era of build-to-order manufacturing. *Industrial Marketing Management*, 34(5), 476–486.
- Simonin, B. L., & Ruth, J. A. (1998). Is a company known by the company it keeps? Assessing the spillover effects of brand alliances on consumer brand attitudes. *Journal of Marketing Research*, 35(1), 30–43.
- Sutton, J. (1991). *Sunk costs and market structure: price competition, advertising and the evolution of concentration*. Cambridge: The MIT Press.
- Tirole, J. (1988). *The theory of industrial organization*. Cambridge: MIT Press.
- Turnbull, P., Ford, D., & Cunningham, M. (1996). Interaction, relationships and networks in business markets: An evolving perspective. *Journal of Business & Industrial Marketing*, 11(3/4), 44–62.
- Turnbull, P., & Wilson, D. (1989). Developing and protecting profitable customer relationships. *Industrial Marketing Management*, 18(3), 233–238.
- Ullaga, W., & Eggert, A. (2006). Value-based differentiation in business relationships: Gaining and sustaining key supplier status. *Journal of Marketing*, 70(1), 119–136.
- van Riel, A. C. R., de Mortanges, C. P., & Streukens, S. (2005). Marketing antecedents of industrial brand equity: An empirical investigation in specialty chemicals. *Industrial Marketing Management*, 34(8), 841–847.
- Vandenbosch, M., & Dawar, N. (2002). Beyond better products: Capturing value in customer interactions. *MIT Sloan Management Review*, 43(4), 35–42.
- Venkatesh, R., & Mahajan, V. (1997). Products with branded components: An approach for premium pricing and partner selection. *Marketing Science*, 16(2), 146–166.

- Wakeam, J. (2003). The five factors of a strategic alliance. *Ivey Business Journal Online*, 67(5), 1–4.
- Washburn, J. H., Till, B. D., & Priluck, R. (2004). Brand alliance and customer based brand equity effects. *Psychology and Marketing*, 21(7), 487–508.
- Wikipedia. (2006). *Intel corporation*. <http://en.wikipedia.org/wiki/Intel#Advertising>, Last Modified December 9, 2006.
- Wilson, D. T. (1995). An integrated model of buyer–seller relationships. *Journal of the Academy of Marketing Science*, 23(4), 335–345.
- Wilson, D. T., & Mummalaneni, V. (1986). Bonding and commitment in buyer–seller relationships: A preliminary conceptualization. *Industrial Marketing and Purchasing*, 1(3), 44–58.
- Wind, Y. (2006). Blurring the lines: Is there a need to rethink industrial marketing? *Journal of Business & Industrial Marketing*, 21(7), 474–481.
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