Brand Name Collaboration and Optimal Tariff*

By

Sugata Marjit
Center for Studies in Social Sciences, INDIA

Hamid Beladi
University of Texas at San Antonio, USA

and

Tarun Kabiraj
Indian Statistical Institute, INDIA.

2005

Correspondence to: Hamid Beladi, Department of Economics, College of Business, University of Texas at San Antonio, San Antonio TX 78249, USA.
Tel: 210-4587038, Fax: 210-458-7040,E-mail: hamid.beladi@utsa.edu

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Abstract

In a Cournot-Nash framework we study the possibility of cross-border brand name collaborations between two firms where superior brand enhances consumers' valuation for the product. We show that a firm owning a superior brand will license its name to a less reputed organization provided the licensee has already established its name to some extent. In other words, "collaborations" tend to take place between the "equals". We extend our analysis to show how a tariff on the reputed brand product affects the conditions for collaboration. We also determine the optimal tariff rate consistent with the host country's welfare maximization.

I. Introduction

Recent years have witnessed a large number of collaborative deals between foreign firms from the developed countries and host firms of the developing countries. Under such a deal, a foreign firm not only transfers its superior production knowledge and complementary inputs, but often allows the local firm to use its brand name in marketing the products. Technology licensing generally reduces production costs[1], but using of a more reputed brand has a positive marketing effect. Functionally, it is difficult to isolate these two effects, but analytically the pure brand name effect should be discussed separately. The purpose of this paper is to study the possibility of a brand name collaboration deal between two such firms across borders abstracting totally from the domain of production cost difference.

By 'brand name collaboration' we mean an agreement between two parties where the licensee gets the right to use the licensor's superior product brand against a payment to the licensor for this use. A brand is considered to be superior if the consumers are willing to pay a higher price for this brand product. So in our analysis the use of such a brand will result in an upward shift of the market demand by means of altering the perception of the consumers about the product. How a brand name may affect the demand for a product is an intriguing question, because products with different brands may have different physical attributes, and it is difficult to isolate the effect of the brand name from those of other attributes.

To the extent a brand name identifies the source of a product, a brand-aware consumer can differentiate the product from its competitors'. A brand's reputation is used as a proxy for quality when consumers are imperfectly informed about the product quality. Hence consumers are willing to pay a price premium for such products. In our paper a brand name increases demand by making the product more appealing to the consumers.[2]

That brand names do affect product demand is clearly documented in the work of Sullivan (1998). After controlling for product attributes, like product quality and

[1] There is a large literature that discusses different aspects of technology transfer. A small subset of this literature includes Chatterjee and Ulvila (1982), Gallini (1984), Shepard (1987), Rockett (1990), Tang and Yu (1990), Wang (1998), Mukherjee (2001), Glass and Saggi (2002), and Kabiraj and Marjit (1992, 2003).

advertisement, the study examines the price ratios of used twin automobiles made in the same plant (therefore, have essentially the same physical attributes) but have different brand names. It is found that the relative prices of most of the twin pairs in the sample differ from unity. This means that consumers do not perceive the twin models to be perfect substitutes. Therefore, parent brand quality has a positive effect on the relative prices of the twin pairs. Indian joint ventures such as BPL-Sanyo, Sony-Orson, Maruti-Suzuki, Hero-Honda, etc. are examples of technological collaborations. But names of Sony, Sanyo, Suzuki and Honda do affect the demand pattern of these goods. In a work Urban and Hauser (1993) observe that customers buy products for the benefits the product delivers. As for illustration, consider General Motors and Toyota in the 1980s. Toyota built cars on the same production line in the MUM joint venture. The Toyota Celica outsold the Chevrolet Nova by a factor of 2, even though the only difference was the brand name. Customers perceived Toyota as a better product.

The motivation behind the paper is the following. India, including some other developing countries, had been following for a long time a policy that restricted entry of the foreign firms in the domestic markets. In such a situation the foreign firms had access to these markets only through some collaborative arrangements with the host-country firms. Then in the 1990's there has been a wave of liberalization all over the world and tariff protection is being reduced phase by phase. As a result entry of the foreign firms has been easier to these countries. Then our question is: can a bilateral collaborative arrangement be mutually profitable even in the newly emerged situation? More particularly, will the foreign firm still transfer its superior brand name to the local host? We discuss the question in a non-cooperative framework where any contract the contracting parties will sign must be self-enforceable. If the legal and institutional system be sufficiently strong and powerful to enforce any contract at a zero or least cost, the firms could write a contract on collusive outcome because it would then maximize their joint profits. But doubts are raised about the existence of such an ideal institutional system. The situation is more vulnerable when we look at the problem in the international

[2] See Aaker (1991). Brands may also appeal to a consumer's individuality or make the consumers feel as if they belong to a particular social group (Wernerfelt (1986)).

context. Even if such an institution exists, proving the case is often very costly and time consuming.

Hence we assume that, in the absence of an effective legal system, the firms cannot write an agreement on the monopoly outcome, because such an outcome is not sustainable as subgame perfect equilibrium. The selling firm would have incentives to re-enter the market after the deal, and so the buyer would have no interest in such a deal. Only the self-enforceable contracts are committed credibly.[3] Therefore, the equilibrium we are concentrating on is the one where, after the collaboration deal, both firms remain in business.[4] We further assume that firms compete in quantities and hence we have a Cournot-Nash framework.[5]

Then our question is: if such a brand name collaboration is mutually profitable, then between which types of firms can such a deal take place? We show that a firm with a superior brand will license its name to a less reputed company only if the latter's reputation in the market is not too far. In other words, collaborations tend to occur between the "equals". The reason is the following. Under a fee contract, a brand transfer agreement is mutually profitable if and only if the post-transfer industry profit exceeds the pre-transfer industry profit. Now, when transfer occurs, there are two opposing effects: *competition effect* will tend to reduce industry profits and *brand* (or *demand shift*)

[3] In a repeated game the players get a chance to retaliate or punish the defector; hence, there are situations where a collusive outcome may be sustained in equilibrium.

[4] There are evidence to show that many foreign companies which have their joint ventures are also operating with 100% owned subsidiaries in the same market. Gillette, for instance, has a 51% stake in Indian Shaving Products Ltd. (ISPL) and has a 100% subsidiary called Gillette India as well. While ISPL does business in Gillette shaving products, Gillette India is operating with the Wilkinson range of shaving products. Both Gillette and Wilkinson are premium brands and would target the same market niche. Similarly, DuPont which has a majority control (95% stakes) in joint venture with Indian partner in nylon production, has also a 100% subsidiary called E.I. DuPont India. Colgate-Cibaca, Kwality-Walls, Thumbs Up-Coke, P&G-Cinthol, etc. are some of many other examples indicating brand transference along with new brand owner's attempt to leverage the equity of the brand. Thus, it is not uncommon to see a company fighting against a brand which it owns or had nurtured for many years.

[5] Generally, comparative static results in a differentiated oligopoly works differently under price and quantity competition. However, in this paper we restrict our attention to quantity competition only. The reason is that in a homogeneous good framework Bertrand price competition is less reliable as predictive theory. In the present model, in the post brand transfer situation both the firms compete with the same brand. So, in the perception of the consumers, firms' goods are perfectly substitutes. Then under non-cooperative competition only the efficient firm will survive. This means, we do not have any scope of explaining the possibility of brand transfer from a superior to a less reputed company under price competition, given our framework. If, however, consumers perceive any difference between the collaborated brand name and the high quality brand name, then Bertrand competition should also generate the similar result as derived in this paper.

effect will tend to increase industry profits. Note that the post-transfer industry profit is the symmetric duopoly industry profit. Then in the pre-transfer situation if the local brand is too inferior, the industry profit is close to monopoly profit of the foreign brand. In such a situation the competition effect dominates and the industry profit falls. But if initially brand differentials are small, the brand effect dominates and the post-transfer industry profit goes up. Thus if the firms are close in respect of their brand differentials, a mutually gainful contract can be signed.

We then analyze how a tariff on superior brand products, if can be committed, can affect the condition of collaboration. In particular, tariffs imposed by the host government can help to sustain the collusion by blocking the entry of the foreign firm in the post-collaboration situation. However, even in the absence of such an institutional intervention, firms might have an incentive to collaborate on brand name, and that is still possible in the non-cooperative framework. Finally, we show that in our structure there is a unique tariff rate, consistent with social welfare maximization, that can be committed credibly, and hence such a tariff is time consistent.

The second section provides the basic model of brand name collaboration in the absence of any tariffs. The third section analyzes the collaboration agreement when the local government precommits a tariff on foreign products. In the fourth section we determine the optimal tariff rate. The last section concludes the paper.

II. The Model and Equilibrium

Consider two firms, foreign and domestic, supplying otherwise physically identical goods in the domestic market. We call these firms as firm 1 and firm 2, respectively. Two sellers' products, however, differ in the sense that consumers are willing to pay a higher price for the foreign brand. Let the inverse demand functions for the foreign and domestic brand products be linear and be given by the following functions,[6]

[6] These demand functions are derived from the utility function $U = u(q_1, q_2) + x$ where $u(q_1, q_2) = [(a_1 q_1 + a_2 q_2) - (1/2)(q_1^2 + q_2^2 + 2q_1 q_2)]$, and x is the consumption of the numeraire good whose price is unity.

$$P_1 = a_1 - (q_1 + q_2)$$
$$P_2 = a_2 - (q_1 + q_2) \quad (1)$$

where P_i is the price of the i^{th} brand product, q_i is the amount of consumption of the i^{th} firm's product, and a_i is the demand parameter representing i^{th} firm's brand, $i = 1, 2$. Since prices and quantities are non-negative, the demand functions are defined only in the positive quadrant. Further, by our assumption,

$$a_1 > a_2 > 0 \quad (2)$$

This reflects that consumers' willingness to pay for the foreign brand product is larger compared to the domestic brand; in other words, $a_1 > a_2$ reflects that firm 1 is more reputed or has a more established brand name. Since we are focusing on the `brand name' differences, we are abstracting from any cost difference, and hence we assume that production costs are zero for both firms.

Firms are assumed to play a Cournot-Nash game (see footnote 5) and we assume that initially there is no government intervention in the form of tax or tariff. We study the possibility of brand name collaboration between these firms where the foreign firm gives the right to use its brand name to the domestic firm and charges a fixed fee.[7] Then after the transfer there will be only the foreign brand in the market, and the market demand as faced by each firm is reduced to:

$$P = a_1 - (q_1 + q_2) \quad (3)$$

where $P_1 = P_2 = P$, because now their products become perfectly substitutes and so the consumers cannot distinguish the products of the domestic firm and the foreign firm. The pre-transfer Cournot-Nash equilibrium outputs are,

$$q_1^* = (2a_1 - a_2)/3 \quad and \quad q_2^* = (2a_2 - a_1)/3 \quad (4)$$

The corresponding Cournot-Nash equilibrium profits are,

$$\Pi_1^* = (2a_1 - a_2)^2/9 \quad \text{and} \quad \Pi_2^* = (2a_2 - a_1)^2/9 \quad (5)$$

At this stage one can easily note that,

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[7] For the literature of optimal licensing contracts, see Kabiraj (2005) and the references therein. Since we frame the problem in the context of a single period, here licensing is equivalent to sell out. Hence we have considered lump-sum fee only. In this framework an output-based royalty contract involves an assumption on the institution.

$$a_2 \leq a_1/2 \Rightarrow q_2^* = 0$$

and firm 1 emerges as monopolist. This is the case when the domestic brand in the eyes of the consumers is so bad that no one purchases even a single unit of that brand in equilibrium. We are assuming an initial duopoly and hence we restrict to the assumption that

$$a_2 \in (a_1/2,\ a_1) \tag{6}$$

Now consider the possibility of brand name collaboration between these firms. As we have explained in the introduction, if the institutional arrangement were strong enough to enforce any contract, then in our case, whether $a_2 > (a_1/2)$, or $a_2 \leq (a_1/2)$, it does not matter, the firms could sign a contract where only the domestic firm would supply the market using the licensed brand name and the foreign firm would stay away from the market but charge a fee from the transferee. However, in this paper we are assuming those situations when collusive agreement is not sustainable, and hence the post-licensing market structure will continue to be duopoly. Then the question is whether there can be a mutually profitable collaborative deal between the firms in the absence of a very efficient institutional arrangement.

Firm 1 will prefer to collaborate iff

$$[a_1^2/9 + F] > \left[(2a_1 - a_2)^2/9\right] \tag{7}$$

where F is the lump sum licensing fee. The left hand side denotes the symmetric Cournot-Nash profit of firm 1, and added to that is the license fee that it receives from firm 2. The total payoff in the new equilibrium must have to exceed the previous Cournot-Nash profit of firm 1. Similarly, a collaborative arrangement is accepted to firm 2 iff

$$[a_1^2/9 - F] > \left[(2a_2 - a_1)^2/9\right] \tag{8}$$

We can now write the following result.

Proposition 1: *A brand name collaboration agreement between two firms under a fixed fee contract is mutually profitable if and only if the firms are close in respect of their brand reputation (i.e.,* $a_2 > (3/5)a_1$*).*

Proof: We show that $\exists F > 0$, satisfying (7) and (8), iff $a_2 > (3/5)a_1$.

From equation (7), we have

$$F > \left[(2a_1 - a_2)^2 / 9 - a_1^2 / 9\right] \equiv F_{\min}$$

and from equation (8)

$$F < \left[a_1^2 / 9 - (2a_2 - a_1)^2 / 9\right] \equiv F_{\max}$$

Then $\exists F > 0$ iff $F_{\max} > F_{\min}$, that is when the following inequality holds,

$$(2a_1^2 / 9) > \left[(2a_1 - a_2)^2 / 9 + (2a_2 - a_1)^2 / 9\right]$$

or,

$$(5a_2^2 - 8a_1a_2 + 3a_1^2) < 0$$

Now if we solve the following quadratic in a_2,

$$(5a_2^2 - 8a_1a_2 + 3a_1^2) = 0$$

we shall have two roots for a_2, that is,

$$a_2 = (3/5)\ a_1, \quad \text{and} \quad a_2 = a_1$$

Hence $\exists F > 0$, or equivalently the relevant inequality is satisfied iff

$$a_2 \in ((3/5)a_1, a_1) \qquad \text{QED}$$

We have already mentioned in the introduction (and it is also evident in the proof) that a mutually profitable brand name transfer agreement under the fee contract will exist if and only if the post-transfer industry payoff is larger than the pre-transfer industry profit. Such a condition will necessarily hold provided that the brand reputation of the transferee is not far less than that of the transferor. In our model, a_2 measures the strength of the local brand vis-à-vis the foreign brand. Then any improvement in a_2 will reduce the duopoly profit of firm 1, and increase that of firm 2. Since payoffs are a quadratic function of outputs, their rates of increment are initially related to their respective market shares. Low values of a_2 imply that firm 2's initial output is very low and any improvement in a_2 will not increase its payoff too much, whereas high values of a_2 will magnify the strategic effect of an increase in a_2 on firm 1's duopoly profit. Therefore, if the initial difference between a_1 and a_2 is large enough, the total Cournot-Nash profit in the industry might go down following such an arrangement. On the other hand, if a_2 is

initially close to a_1, total industry profits will go up and hence brand name collaboration will be profitable.

The result is shown in *Figure 1* where $A(a_2)$ is the pre-transfer industry profit. The post-transfer (symmetric) industry profit is $A(a_1) = A_s$, and for $a_2 \leq (a_1/2)$, $A(a_2) = A_m$ is the monopoly profit that dominates A_s. Moreover, $A(a_2)$ is *U*-shaped over $(a_1/2) < a_2 < a_1$, with a minimum at point *K* where $a_2 = (4/5)a_1$. Thus $A(a_2)$ intersects A_s at two points, *N* where $a_2 = (3/5)a_1$ and *Q* where $a_2 = (a_1)$, and for $(3/5)a_1 < a_2 < a_1$, $A_s > A_m$, giving the possibility of mutually profitable collaboration over the region *NQ*.

One may then be interested in the determination of F. In the principal-agent structure where the foreign firm offers the contract and the domestic firm accepts the offer if at least it gets the reservation payoff, in the optimal contract the foreign firm extracts all surplus, that is,

$$F = \left[A_s - A(a_2)\right] = (a_1^2/9) - (2a_2 - a_1)/9 \qquad (9)$$

which is positive for all $a_2 \in ((3/5)a_1, a_1)$. One can also think of a bargaining game to determine F. The simplest case is the Nash-bargaining solution that is based on dividing the surplus payoff equally. More formally, the problem is,

$$\underset{F}{Max}\left[a_1^2/9 + F - (2a_1 - a_2)^2/9\right]\left[a_1^2/9 - F - (2a_2 - a_1)^2/9\right]$$

From this maximization we obtain,

$$F^* = (1/2)\left[(2a_1 - a_2)^2/9 - (2a_2 - a_1)^2/9\right]$$

A little manipulation yields the equilibrium fee as,

$$F^* = (3/18)(a_1 - a_2)\ (a_1 + a_2) \qquad (10)$$

A glance at equation (10) reveals that the greater is a_1 relative to a_2, the higher would be the fee that the low quality firm has to pay. The license fee under Nash-bargaining is related to the relative importance of the high quality brand, i.e., $(a_1 - a_2)$.

III. Tariffs and Brand Name Collaboration

Let us now assume that the local government can pre-commit to a tariff rate, t, per unit of foreign seller's product. In what follows, we argue how this intervention policy can be a guiding force in inducing brand name collaboration.

That the foreign brand and the collaborative brand may co-exist simultaneously in a market is documented in the literature (see footnote 4). In our paper the unique subgame perfect equilibrium of the game is characterized by such a co-existence because the reputed brand cannot credibly pre-commit to exit from the market even after the agreement is signed. Unless one brings in a repeated game structure, any strategic justification of collusion would be very difficult. But in practice high tariff rates can effectively deter entry of multinationals into the local market. By introducing a tariff on the foreign (reputed brand) products, we have the following demand function as perceived by firm 1,

$$P_1 = (a_1 - t) - (q_1 + q_2) \tag{11}$$

where $t > 0$ is the tariff rate. Now define $\tilde{a}_1 = (a_1 - t)$ and just repeat the analysis of the previous section. Then it is easy to see that for $t \geq (2a_1 - a_2)/2$, the foreign brand will cease to exist in the local market under non-cooperative competition and the domestic brand will have monopoly. In such a situation, collaboration would have natural benefits for both parties by increasing a_2 to a_1.

Now consider a more interesting scenario and assume that initially,

$$\begin{gathered} 0 < t < (2a_1 - a_2)/2 \\ \textit{i.e.,}\ 2\tilde{a}_1 > a_2 \end{gathered} \tag{12}$$

This means that in the pre-transfer situation both brands sell positive output, with the local brand enjoying a greater market share by virtue of a high tariff. Then it is straight forward to argue that once the brand name is licensed, the foreign firm will continue to co-exist in the market iff,

$$t < (a_1/2) \tag{13}$$

This is obtained from the inequality (12) on substitution $a_2 = a_1$, or simply from $2\tilde{a}_1 > a_1$. Thus if,

$$a_2 < 2\tilde{a}_1 \leq a_1$$

or if,

$$t \in \left[a_1/2, (2a_1 - a_2)/2\right] \tag{14}$$

then initially we have Cournot equilibrium, but the post-licensing equilibrium is domestic monopoly with superior brand, and a profitable collaboration can always occur.

So let us concentrate on the case where tariffs are not high enough to prevent entry of the foreign firm in the post-transfer situation. This is the situation when $2\tilde{a}_1 > a_1$ or $t < (a_1/2)$ which is the condition given in equation (13). Our question is: given (13), does there still exist a positive F such that a brand name collaboration deal can be signed although licensor's entry will occur for sure? It is easy to get the following result.

Proposition 2: *Given a tariff intervention, a brand name collaboration deal will exist iff* $t \in \left[(3a_1 - 5a_2)/8, a_1/2\right]$.

Proof: We know that $\exists F > 0$ iff the post-licensing industry profit is larger than the pre-licensing industry profit, that is,

$$\left[(2\tilde{a}_1 - a_1)^2/9 + (2a_1 - \tilde{a}_1)^2/9\right] > \left[(2\tilde{a}_1 - a_2)^2/9 + (2a_2 - \tilde{a}_1)^2/9\right]$$

or, we can write,

$$t > (3a_1 - 5a_2)/8$$

Since $(3a_1 - 5a_2)/8 < a_1/2$, hence,

$$\exists\, t \in \left[(3a_1 - 5a_2)/8, a_1/2\right] \qquad \text{QED}$$

This shows that even when there are tariffs on foreign brand goods such that the pre-transfer market structure is duopoly, a mutually profitable brand name collaboration is still possible with a post-licensing duopoly structure. Here tariffs help collaboration as it reduces the effective difference between the firms, thus Proposition 1 applies.[8] The following table summarizes the above discussion:

[8] The way tariffs on foreign products help collaboration, a subsidy (s) on domestic products may do the same in our paper to the extent a subsidy also reduces the effective difference between the firms. It is easy to see that $\forall s \in (0, 2a_1 - a_2)$, the pre-transfer equilibrium is duopoly, and $\forall s \in (0, a_1)$, the post-transfer equilibrium is also duopoly; finally, the brand transfer is mutually profitable iff $s \in ((3a_1 - 5a_2)/10, a_1)$.

Table 1: Different levels of tariffs and the resulting market structures.

	Level of Tariff	Pre-licensing Market Structure	Post-licensing Market Structure	Collaboration
Case (1)	Zero	Cournot	Cournot	Yes iff $a_2 > (3/5)a_1$
Case (2)	Low	Cournot iff $t < (2a_1 - a_2)/2$	Cournot iff $t < (a_1/2)$	Yes iff $t > (3a_1 - 5a_2)/8$
Case (3)	Medium	Cournot iff $t < (2a_1 - a_2)/2$	Monopoly iff $t \geq (a_1/2)$	Yes
Case (4)	High	Monopoly iff $t \geq (2a_1 - a_2)/2$	Monopoly	Yes

Case (1) refers to our original analysis without a tariff. For cases (2) and (3), market share of the foreign firm shrinks in the post-licensing game[9]. Case (4) is the pure monopoly case where firms share the incremental payoff due to an increase of a_2 to a_1. This analysis of course assumes the ability of the government to pre-commit to a tariff rate. As long as the tariff rate is not too high, such as in Cases (1) and (2), a close proximity of brand names might be necessary for collaboration. The strength of our original result lies in the fact that even without trade distortions (such as a tariff), there is a case for brand name collaboration.

IV. The Optimal Tariff Rate

Given the possibility of brand name collaboration, in this section we attempt to determine the optimal tariff rate that is consistent with the maximization of the host country's welfare. The intriguing problem in this context is how to pre-commit a tariff.

From the viewpoint of the host country, tariffs generate revenue whereas subsidy is a cost. Hence the host country government generally prefers tariffs to subsidy.

[9] This is so because $\left[(2\tilde{a}_1 - a_2)/(2a_2 - \tilde{a}_1)\right] > \left[(2\tilde{a}_1 - a_1)/(2a_1 - \tilde{a}_1)\right]$, as $a_2 < a_1$.

The tariff rate can be committed credibly only if there exists a time consistent tariff, invariant with respect to the post-licensing entry of the foreign firm. As we show below, in our structure there does exist such a time consistent tariff rate, and hence the commitment problem is simplified.

Let us start with the assumption that $t < (2a_1 - a_2)/2$, so that initial duopoly is ensured. The pre-licensing social welfare (*W*) is defined as the sum of consumer surplus (*CS*), local firm's payoff (π_2) and tariff revenue (T_f) on foreign firm's products, i.e.,

$$W = CS + \pi_2 + T_f \tag{15}$$

By using the utility function given in Section II, we have income effect equals to zero, and hence the true measure of consumer surplus is,

$$CS = \left[u(q_1^*, q_2^*) - P_1^* q_1^* - P_2^* q_2^*\right] \tag{16}$$

where (q_1^*, q_2^*) and (P_1^*, P_2^*) are respectively quantity and price vector in the pre-licensing equilibrium situation. On substitution in the welfare function we have,

$$\begin{aligned} W &= \left[u(q_1^*, q_2^*) - P_1^* q_1^* - P_2^* q_2^*\right] + P_2^* q_2^* + t q_1^* \\ &= u(q_1^*, q_2^*) + (t - P_1^*) q_1^* \end{aligned} \tag{17}$$

Therefore,

$$dW/dt = 0 \;\Rightarrow\; t^* = a_1/3 \quad \text{and} \quad d^2W/dt^2 < 0 \tag{18}$$

So the pre-licensing optimal tariff is $t^* = (a_1/3)$ (see *Appendix A*). It may be noted that a positive tariff (at the optimal level) is a better choice than a zero or prohibitive tariff. Also $t^* < (a_1/2)$, and therefore, at t^* the foreign firm will enter in the post-licensing situation. Since the pre-transfer optimal tariff is independent of a_2, one may expect that the post-licensing optimal tariff will remain unchanged. In fact, this can be verified easily, by maximizing the post-licensing welfare function[10] with respect to *t*. Thus, t^* is the time-invariant optimal tariff. In our structure its existence and uniqueness is guaranteed. However, to have such a brand name collaboration mutually profitable it is

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[10] The post-licensing welfare function is obtained on substitution of a_1 for a_2 in (17) and then by deducting the lump-sum payment.

necessary that the optimal tariff will belong to the interval $\left[(3a_1 - 5a_2)/8,\ a_1/2\right]$ (see Proposition 2). For this to be the case we however need the restriction that $a_2 > (1/15)a_1$. We summarize the above discussion in the following proposition.

Proposition 3: *Assume* $a_2 > (1/15)a_1$. *Then there exists a time consistent welfare-maximizing tariff rate at which a mutually profitable brand name collaboration deal is possible.*

V. Concluding Remarks

We have provided a duopolistic model of brand name collaboration and demonstrated that even in the absence of collusion in the product market, a high-reputed-brand firm could license its name to a relatively less-reputed firm. Such an agreement is likely to occur between the firms which are not "too apart" in terms of their initial brand reputation. Existence of a tariff on the high quality brand products would affect the condition for collaboration. In particular, very high tariff rates would definitely induce collaboration because of the resulting monopoly of the local business enterprise. However, a low tariff rate that guarantees the co-existence of brands would lead to collaboration once our basic condition holds. We have also derived the optimal tariff rate from the host country's perspective. Our analysis with tariffs generates some realistic equilibrium where, in the post-licensing situation, the original high quality brand commands either a zero or low market share. Our theoretical structure bears ample evidence that, in spite of a zero tariff, collaboration may be an equilibrium outcome.

One alternative way to improve the local brand quality should be to advertise and promote a_2. Suppose the local firm could incur a sunk advertising cost, R, and lift a_2 to a_1. Then it is easy to see that collaboration equilibrium will dominate such an outcome for $F \in (0, R)$. The intuition is that if already an established brand, as represented by a_1, is available, one should not bother to create the same. The foreign firm can always charge a fee $F < R$ and strike the deal.

We may note the following. In this paper we have assumed that the demand functions are linear. This is restrictive in the sense that with general demand functions

one will not necessarily get nicely behaved curve such as $A(a_2)$ drawn in *Figure* 1. Still with some restrictions on demand functions one can replicate the results derived in this simple framework (see *Appendix B*). To that extent our paper serves as a useful purpose. Also, given the shortage of analytical models dealing with brand name collaborations, our framework serves as a starting point and, of course, it is not an end in itself. Finally, although we have chosen India as a reference point, our paper provides a whole set of theoretical results relevant for an emerging market.

Appendix

A. The optimal tariff in the pre-and post-licensing equilibrium

In the pre-licensing equilibrium we have: $q_1^* = [2(a_1 - t) - a_2]/3$, $q_2^* = [2a_2 - a_1 + t]/3, P_1^* = [2a_1 - a_2 + t]/3$, and $P_2^* = [2a_2 - a_1 + t]/3$. The domestic welfare function is given by (18). Therefore,

$$\begin{aligned}\frac{dW}{dt} &= \frac{\partial u}{\partial q_1}\frac{dq_1^*}{dt} + \frac{\partial u}{\partial q_2}\frac{dq_2^*}{dt} + (t - P_1^*)\frac{dq_1^*}{dt} + q_1^*(1 - \frac{dP_1^*}{dt}) \\ &= P_1^*\frac{dq_1^*}{dt} + P_2^*\frac{dq_2^*}{dt} + (t - P_1^*)\frac{dq_1^*}{dt} + q_1^*(1 - \frac{dP_1^*}{dt}) \\ &= t\frac{dq_1^*}{dt} + P_2^*\frac{dq_2^*}{dt} + q_1^*(1 - \frac{dP_1^*}{dt}) = -t + \frac{a_1}{3}\end{aligned}$$

Hence,

$$dW/dt = 0 \;\Rightarrow\; t^* = a_1/3 \text{ and } d^2W/dt^2 < 0$$

In the post-licensing situation, the equilibrium values are obtained on substituting a_1 for a_2. Therefore, the optimal tariff rate remains unchanged.

B. Characterization of $A(a_2)$ function with a more general demand function

Consider the following demand function,

$$P_i = a_i + f(\sum_{j=1}^{2} q_j),\ i = 1,\ 2 \text{ with } f' < 0, \mathrm{f}'' < 0 \text{ and } \mathrm{f}''' = 0.$$

Then to have a mutually gainful licensing agreement, we need to show that the industry profit function behaves properly, and in particular, it is increasing at q_2 close to q_1. Now, using the envelope conditions we have

$$\frac{d(\pi_1 + \pi_2)}{da_2} = \frac{\partial \pi_1}{\partial q_2}\frac{dq_2}{da_2} + \frac{\partial \pi_2}{\partial q_1}\frac{dq_1}{da_2} + \frac{\partial \pi_2}{\partial a_2}$$

We can derive the following comparative static results,

$$\frac{dq_1}{da_2} = \frac{f' + q_1 f''}{D},\ \frac{dq_2}{da_2} = -\frac{2f' + q_1 f''}{D},\ \frac{\partial \pi_1}{\partial q_2} = q_1 f',\ \frac{\partial \pi_2}{\partial q_1} = q_2 f' \text{ and } \frac{\partial \pi_2}{\partial a_2} = q_2$$

where,

$$D = \begin{vmatrix} 2f' + q_1 f'' & f' + q_1 f'' \\ f' + q_2 f'' & 2f' + q_2 f'' \end{vmatrix} = f'[3f' + (q_1 + q_2) f'']$$

Therefore, $\frac{d(\pi_1 + \pi_2)}{da_2} > 0$ iff

$$q_2 f'[3f' + (q_1 + q_2) f''] + q_2 f'[f' + q_1 f''] - q_1 f'[2f' + q_1 f''] > 0 \qquad \text{(B.1)}$$

Now it is easy to check that the LHS of (B.1) is negative at $q_2 = 0$, positive at $q_2 = q_1$, and is increasing in q_2. Given that the industry profit function is increasing at $q_2 = q_1$, with continuity it will be so even for some lower values of q_2, but very low values will not satisfy the condition.

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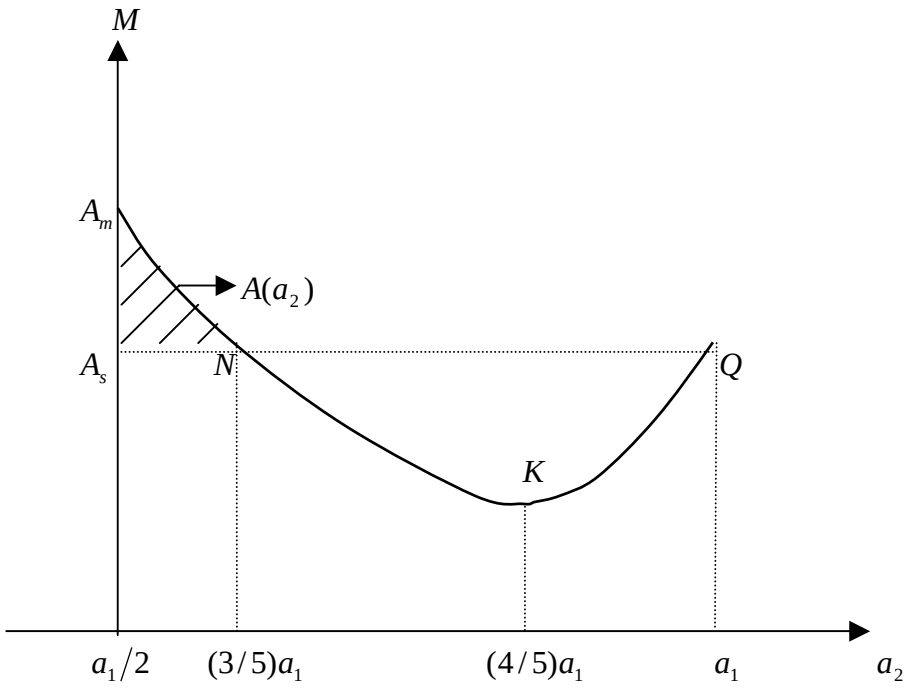

Figure 1: The shaded region shows the impossibility of collaborative agreements.