The Role of Franchise Fees and Manufacturers' Collusion

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Abstract:

This paper analyzes the rationale for franchise fees in a successive oligopoly model. In a real market, manufacturers seldom charge two-part tariffs to their independent retailers. From the prospective of manufacturers, two-part tariffs have the beneficial effect of settling down double marginalization problem in a successive market. However, it also produces the detrimental effect that it makes the retail market pro-competitive. We consider two producers who sell a homogeneous product through their exclusive retailers who compete in the retail market. Firstly, by comparing two-part tariffs (=franchise fee contract) with linear tariffs, we show that the latter may be better than the former. Secondly, we show, in an infinitely repeated game with a trigger strategy, that manufacturers may choose two-part tariffs as a trigger strategy Nash equilibrium. The logic accounts for a rare distribution practice (=franchise fee contract) between manufacturers and retailers in a successive market. It also gives manufacturers a rationale for whether they will charge two-part tariffs or not.

Key words: Franchise Fees, Competition, Double Marginalization, Collusion

1. Introduction:

In many markets, it is rare that manufacturers directly sell a final product to consumers. Most commonly, manufacturers sell the product to retailers, who then sell it to consumers. When they do not conduct the sales task internally, but want exclusive retailers, they usually enter into a contract with retailers. There are two forms of contract. One is a simple contract consisting of a per unit wholesale price. The other consists of two-part tariffs.[1] A puzzling feature in many retail markets is why manufacturers generally use the uniform wholesale pricing. Our paper approaches the question of whether both manufacturers charge franchise fees or not in an infinitely repeated game. We consider a simple economy in which each manufacturer sell a

1 Two-part tariffs, also denoted a franchise fee pricing, consist of a fixed fee and a constant per unit wholesale price from the retailer to the manufacturer. A linear tariff consists of a constant per unit wholesale price only.

homogeneous final product to exclusively independent retailers who sell it to consumers. Theoretically, from the prospective of manufacturers, franchise fee has two economic effects on a final market. Franchise fee pricing has a beneficial effect of settling down double marginalization problem. However, it also produces a detrimental effect that makes the retail market be even more competitive than a linear tariff pricing.

Previous research on the two-part tariff has followed two separate streams. One stream focuses on the relationship between a manufacturer and a retailer or retailers. The other stream focuses on the competitive relationship between two manufacturers that each contract with exclusive retailers. The first framework both explores and justifies the two-part tariff.[2] At first shown by Spengler (1950), a franchise fee pricing can be used to solve the double marginalization problem in a successive monopoly market. When a manufacturer sells a product to its retailer at the manufacturer's marginal cost, the retailer will set the retail price that maximizes the channel profit. In turn, the manufacturer extracts the retailer's profit through the fixed fee.

The second framework examines the implication of manufacturers' strategic behavior from the prospective of manufacturers.[3] In industrial organization, manufacturers maximize their profit by charging the franchise fees that extract the entire profit generated by their exclusive retailers. However, the franchise fee pricing may be flawed if there are multiple manufacturers. The reason is that the franchise fee pricing can intensify the competition between retailers. Therefore, in a successive model, the franchise fee pricing is a trade-off relationship between pro-competition and profit extraction effect. The study of the pro-competitive effect of two-part tariffs is firstly examined by Gal-or (1991 a).[4] She examined a model with two manufacturers selling differentiated products to an exclusive retailer. Each upstream firm chooses either a two-part or a linear tariff. If both producers decide the linear tariff, they extract profits only through a wholesale price above marginal cost which induces the retailers to set high retail prices. Such a soften competition effect is more important the products are close substitutes. She also finds that both producers are better off if both set linear pricing rather than two-part tariffs when both products are sufficiently close substitutes. Regretfully, each manufacturer's dominant strategy is to choose a two-part tariff in a single period game even if each manufacturer's payoff will be better off in the linear pricing rather than in the two-part tariff.

One concern in this paper is what happens if the manufacturers sell to multiple retailers. Another concern is what happens if the pro-competitive effect outweighs the profit extraction

2 For example, Spengler (1950), Rubin (1978), Lal (1990), Nariu et al. (2009).

3 See Bonanno & Vickers (1988), Gal-Or (1991 a), Rey & Stiglitz (1995), and so on.

4 Gal-or (1991 a) can be shown as an extension of Bonanno & Vickers (1988). They analyzed a model with two producers deciding whether vertical integration with one retailer or vertical separation selling the product to one separate retailer with imposing a two-part tariff. They show that there is a strategic incentive to use the two-part tariff pricing with wholesale price above marginal costs. When wholesale prices are set above marginal costs, it will induce the retailer to set a higher retail price than its wholesale price. Then, the rival retailer also set the higher retail price than its wholesale price.

effect in an infinitely repeated game. Firstly, by comparing the two-part tariff with the linear tariff pricing, we show that the payoffs in the latter case may to be better than those of the latter case. Regretfully, the equilibrium of the linear tariff pricing may not be sustained in a single-period game. Therefore, manufacturers have an incentive to cooperate to achieve the equilibrium. Secondly, we show, in an infinitely repeated game with a trigger strategy, that each manufacturer may choose the linear tariff pricing as a trigger strategy Nash equilibrium. The logic accounts for a rare distribution practice (=franchise fee) in the manufacturer-retailers relationship of competing supply chains. It also gives manufacturers the rationale of whether they will charge the franchise fees to their independent retailers or not.

This paper is organized as follows. In section 2, we formulate the model. Section 3 analyzes whether manufacturers employ a linear or two-part tariffs in a static game. Section 4 examines the problem in an infinitely repeated game. Section 5 concludes our results.

2. The Model:

Consider an economy in which each manufacturer sells a homogeneous final product to exclusively independent retailers. Let $M = \{1,2\}$ be the set of manufacturers. For each manufacturer $i \in M$, let $N = \{1, 2, \cdots, j, \cdots, n\}$ be the set of exclusively independent retailers. Each manufacturer i offers the same contract (w_i, f_i) to each exclusive retailer ij, where w_i is the wholesale price and f_i is the franchise fee. Retailer ij obtains zero profit if it rejects the offer. The market clearing price is

$$P(Q) = a - Q = a - \sum_i \sum_j q_{ij} \tag{1}$$

where a is a constant and q_{ij} is the sales quantity of each exclusive retailer ij.

Each manufacturer i has a marginal cost c and no fixed cost. For simplicity, we assume there is no retail cost.

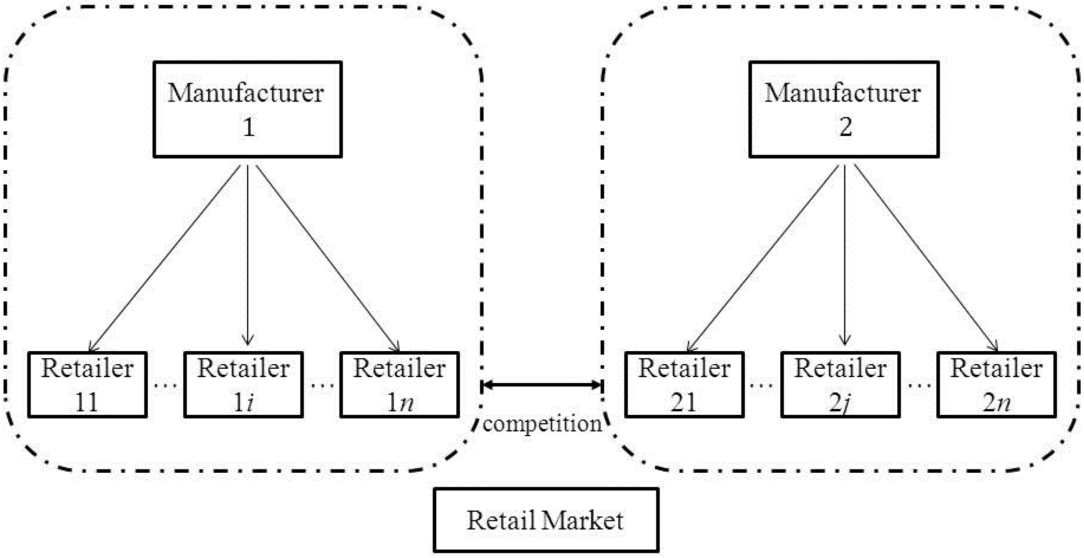

Figure 1. Economy

We posit three-stage game. At stage one, each manufacturer i determines whether to offer a franchise contract or to offer no franchise contract to its exclusive retailers. At stage two, if manufacturer i chooses the franchise contract at stage one, manufacturer i offers a franchise contract to its exclusive retailers. The contract has two variables; wholesale price and franchise fee. On the other hand, if no franchise contract is chosen at stage one, manufacturer i offers a uniform wholesale price to its exclusive retailers. At stage three, each retailer sets the sales quantity.

3. Analysis:

3.1 Franchise Fee Contract

We first consider the case in which each manufacturer charges a franchise fee to its exclusive retailers. At stage three, retailer ij's maximization problem is

$$max_{q_{ij}} \quad \pi_{ij} = (P - w_i)q_{ij} - f_i.$$

Retailer ij chooses the sales quantity as the function of wholesale price as follows:

$$q_{ij}\left(w_i, w_j\right) = \frac{a-(n+1)w_i+nw_j}{2n+1}. \tag{2}$$

At stage two, manufacturer i chooses a wholesale price w_i and a franchise fee f_i so as to maximize its profit. Manufacturer $i's$ maximization problem is as follows:

$$max_{w_i,\ f_i} \quad \pi_i = \sum_{i=1}^{n}(w_i - c)q_{k(i)} - f_i$$

$$s.t. \quad \pi_{ij} = (P - w_i)q_{ij} - f_i \geq 0$$

$$w_i \geq 0.$$

Note that the first constraint is binding. So, we rewrite the above equation as follows:

$$max_{w_i} \quad \pi_i = \frac{n\left((a-(n+1)w_i + nw_j)\right)\left(a-(2n+1)c + n\left(w_i + w_j\right)\right)}{(2n+1)^2}.$$

The equilibrium wholesale price for manufacturer i is derived as follows:

$$w_i^F = \frac{(n+1)(2n+1)c-a}{n(2n+3)}. \tag{3}$$

where the superscript ‘F’ denotes franchise contract. The equilibrium for franchise fee contract is described in Table 1.

Table 1 : Equilibrium for franchise fee contract

	1, 2
P^F	$\frac{a+2(n+1)c}{(2n+3)}$
q_{ij}^F	$\frac{(n+1)(a-c)}{(2n+3)}$
w_1^F, w_2^F	$\frac{(n+1)(2n+1)c-a}{n(2n+3)}$
π_1^F, π_2^F	$\frac{(n+1)(a-c)^2}{(2n+3)^2}$
f_1^F, f_2^F	$\frac{(n+1)^2(a-c)^2}{n^2(2n+3)^2}$

3.2 No Franchise Fee Contract

We next consider the case in which each manufacturer does not charge franchise fee to its exclusive retailers. Note that, at stage three, retailer ij's behavior is the same result as Eq. (2). Therefore, at stage two, manufacturer i chooses a wholesale price w_i so as to maximize its profit. Manufacturer i's maximization problem is as follows:

$$max_{w_i} \quad \pi_i = \sum_{i=1}^{n}(w_i - c)q_{ij}.$$

The equilibrium wholesale price for manufacturer i is derived as follows:

$$w_i^{NF} = \frac{a+(n+1)c}{(n+2)}. \tag{4}$$

where the superscript 'NF' denotes no franchise contract. The equilibrium for no franchise contract is described in Table 2.

Table 2 : Equilibrium for no franchise fee contract

	1, 2
P^{NF}	$\frac{(3n+2)a+2n(n+1)c}{(2n^2+5n+2)}$
q_{ij}^{NF}	$\frac{(n+1)(a-c)}{(2n^2+5n+2)}$
w_1^{NF}, w_2^{NF}	$\frac{a+(n+1)c}{n+2}$
π_1^{NF}, π_2^{NF}	$\frac{(n+1)^2(a-c)^2}{(2n^2+5n+2)^2}$
$\pi_{1j}^{NF}, \pi_{2j}^{NF}$	$\frac{n(n+1)(a-c)^2}{(n+2)^2(2n+1)}$

Specifically, we set an assumption to guarantee that the wholesale price is positive as follows;

Assumption 1. $\frac{a}{c} < (n+1)(2n+1)$.

Proposition 1: Under Eq. (1) and Assumption 1, if the number of retailers is greater than 1, manufacturers' profit in non-franchise fee contract is greater than that in franchise fee contract.

3.3 Asymmetric Case

We now turn to the asymmetric case in which manufacturer 1 offers no franchise contract, while manufacturer 2 offers franchise contract to its exclusive retailers. At stage three, retailer $1j$'s maximization problem is

$$max_{q_{1j}} \quad \pi_{1j} = (P - w_1)q_{1j}.$$

On the other hand, retailer $2j$'s maximization problem is

$$max_{q_{2j}} \quad \pi_{2j} = (P - w_2)q_{2j} - f_{2j}.$$

Note that, at stage three, retailer ij's behavior is the same result as Eq. (2).
At stage two, manufacturer 1 chooses a wholesale price w_1 so as to maximize its profit. Manufacturer 1's maximization problem is as follows:

$$max_{w_1} \quad \pi_1 = \sum_{j=1}^{n}(w_1 - c)q_{1j} = \frac{n(w_1 - c)(a - (n+1)w_1 + nw_2)}{(2n+1)}.$$

On the other hand, at stage two, manufacturer 2 chooses a wholesale price w_2 and a franchise fee f_{2j} so as to maximize its profit. Manufacturer 2's maximization problem is as follows:

$$max_{w_2,\ f_{2j}} \quad \pi_2 = \sum_{j=1}^{n}(w_2 - c)q_j - f_{2j}$$

$$s.t. \quad \pi_{2j} = (P - w_2)q_j - f_{2j} \geq 0$$

$$w_2 \geq 0.$$

Note that the first constraint is binding. So, we rewrite the above equation as follows:

$$max_{w_2} \quad \pi_2 = \frac{n((a - (n+1)w_2 + nw_1))\big(a - (2n+1)c + n(w_1 + w_2)\big)}{(2n+1)^2}.$$

The equilibrium wholesale prices for manufacturers are derived as follows:

$$w_1^{ANF} = \frac{(2n+1)a + (n+1)(4n+3)c}{4n^2 + 9n + 4} \tag{5-1}$$

$$w_2^{AF} = \frac{(n+1)(4n^2+5n+2)c - (3n+2)a}{n(4n^2+9n+4)} \tag{5-2}$$

where the superscript 'ANF' denotes asymmetric no franchise contract and the superscript 'AF' denote asymmetric franchise contract. The equilibrium for asymmetric contract is described in Table 3.

Table 3 : Equilibrium for asymmetric contracts
(manufacturer *1*: no franchise fee contract, manufacturer *2* : franchise fee contract)

	1, 2
p^A	$\frac{(3n+2)a+2(n+1)(2n+1)c}{(4n^2+9n+4)}$
$q_{1j}^{ANF}, q_{2j}^{AF}$	$\frac{(n+1)(a-c)}{(4n^2+9n+4)}, \frac{(n+1)(3n+2)(a-c)}{n(4n^2+9n+4)}$
w_1^{ANF}, w_2^{AF}	$\frac{(2n+1)a+(n+1)(4n+3)c}{(4n^2+9n+4)}, \frac{(n+1)(4n^2+5n+2)c-(3n+2)a}{n(4n^2+9n+4)}$
π_1^{ANF}, π_2^{AF}	$\frac{n(n+1)(2n+1)(a-c)^2}{(4n^2+9n+4)^2}, \frac{(n+1)(2n+1)^2(a-c)^2}{(4n^2+9n+4)^2}$
π_{1j}^{ANF}	$\frac{(n+1)^2(a-c)^2}{(4n^2+9n+4)^2}$

Sales quantity, wholesale price, and payoff for channel *1* are seen in the first term, and those for channel 2 are also seen in the second term.

Specifically, we set an assumption to guarantee that the wholesale price is positive as follows;

Assumption 2. $\frac{a}{c} < \frac{(n+1)(4n^2+5n+2)}{(3n+2)}$.

Proposition 2: Let us assume a single static game. Under Eq. (1) and Assumption 2, Franchise fee contract is the sub-game perfect equilibrium outcome. However, the profit in franchise fee contract is smaller than that in no franchise fee contract.

4. Infinite Repeated Game:

In this section, we consider an infinitely repeated game based on the above stage game when both manufacturers have the discount factor δ. We now compute the values of δ for which it is a sub-game perfect Nash equilibrium of this infinitely repeated game for both manufacturers to play the following trigger strategy:
Choose no franchise fee contract in the first period. In the t^{th} period, choose no franchise fee contract if both manufacturers have chosen no franchise fee contract in each of the $t-1$

previous periods; otherwise, choose franchise fee contract.

Since the argument parallels that given for the Prisoner's Dilemma (See Proposition 2) in the previous section, we keep the discussion brief. The profit to one manufacturer, when both choose no franchise contract, is $\pi_i^{NF} = \frac{(n+1)^2(a-c)^2}{(2n^2+5n+2)^2}$. The profit to one manufacturer, when both choose franchise contract, is $\pi_i^{F} = \frac{(n+1)(a-c)^2}{(2n+3)^2}$. Finally, if manufacturer 1 is going to choose no franchise fee contract this period, the profit that manufacturer 2 choose franchise fee contract is $\pi_2^{AF} = \frac{(a-c)^2(n+1)(2n+1)^2}{(4n^2+9n+4)^2}$. Thus, it is a Nash equilibrium for both manufacturers to play the trigger strategy given provided that

$$\frac{1}{1-\delta}\pi_i^{NF} \geq \pi_2^{AF} + \frac{\delta}{1-\delta}\pi_i^{F}. \tag{6}$$

Table 4 : Manufacturers' payoffs in the four possible outcome

		Manu. 2	
		Franchise Fee Contract	Non-Franchise Fee Contract
Manu. 1	Franchise Fee Contract	$\{\pi_1^{F}, \pi_2^{F}\}$	$\{\pi_1^{AF}, \pi_2^{ANF}\}$
	Non-Franchise Fee Contract	$\{\pi_1^{ANF}, \pi_2^{AF}\}$	$\{\pi_1^{NF}, \pi_2^{NF}\}$

Payoff for manufacturer 1 is seen in the first term, and that for manufacturer 2 is seen in the second term.

Substituting the values of π_i^{NF}, π_i^F, and π_2^{AF} into Eq. (6) yields the following result.

$$\frac{1}{1-\delta}\pi_i^{NF} \geq \pi_2^{AF} + \frac{\delta}{1-\delta}\pi_i^F \ \text{ if } \ \delta \geq \frac{8n^6+148n^5+710n^4+1495n^3+1552n^2+768n+144}{4(n+2)^2(10n^4+37n^3+48n^2+26n+5)}.$$

Proposition 3: Under Eq. (1), if n (=the number of retailers of each supply chain) approaches to an infinite number and $\delta > 1/5$, both manufacturers choose franchise fee contract.

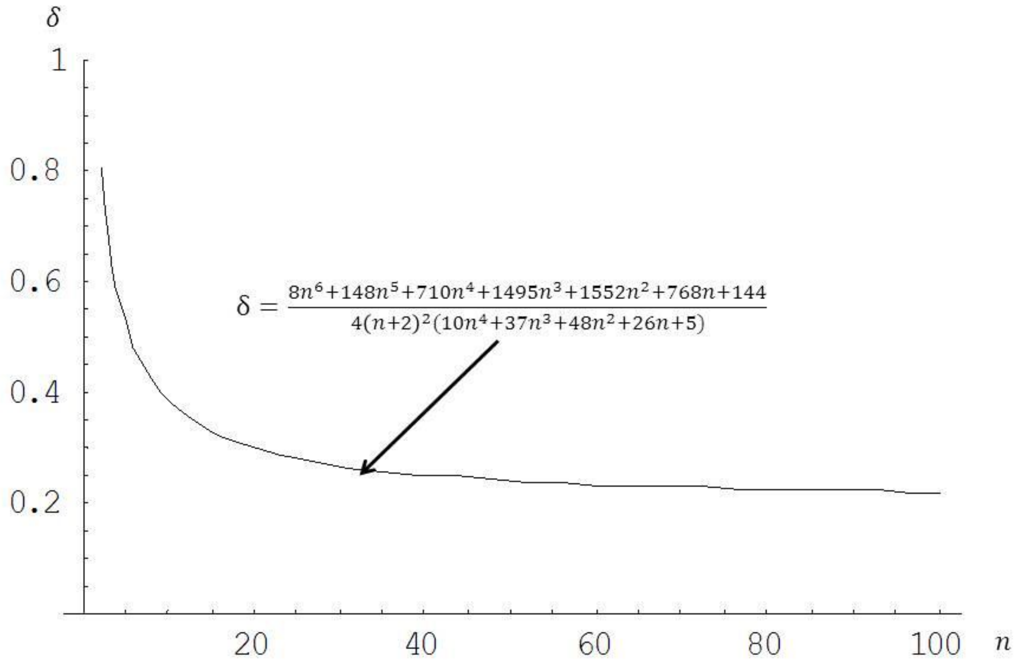

Figure 2. The boundary of δ

5. Conclusion:

In the conventional literature, a franchise fee contract has been regarded as superior to no-franchise fee contract in a successive monopoly. It has been discussed that a franchise fee contract may solve the horizontal and vertical externality caused by double marginalization. It also extracts retailers' profit via the fixed fee. However, two-part tariffs make a retail market be pro-competitive. Firstly, by comparing the franchise fee contract with non-franchise fee contract, we showed that the profits in the latter case might be better than those of the former case. Secondly, we showed, in an infinitely repeated game with a trigger strategy, that manufacturers might choose non-franchise fee contract as the collusive outcome. The logic accounts for a rare franchise fee contract in the manufacturer-retailers relationship of competing supply chains. Our result will give manufacturers the rationale for whether to charge the franchise fees or not to their exclusive retailers.

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