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Vertical coordination through renegotiation☆

Ö. Bedre-Defolie[1]

Abstract

This paper analyzes the strategic use of bilateral supply contracts in sequential negotiations between one manufacturer and two differentiated retailers. The first main result is that, despite the feasibility of general supply contracts which are functions of own quantity (but cannot be contingent on the rival's quantity), the first contracting parties have incentives to manipulate their contract to shift rent from the second contracting retailer and these incentives distort the industry profit away from the fully-integrated monopoly outcome. The second main result is that if the contract terms between the manufacturer and the first retailer can be renegotiated from scratch in the event that the second retailer has no agreement, then the monopoly outcome can be achieved, often with full rent extraction from the second retailer. Moreover, there are conditions under which renegotiation from scratch yields higher joint profit for the firstly contracting parties than no renegotiation. These results do not depend on the type of retail competition, the level of differentiation between the retailers, the order of sequential negotiations, the level of asymmetry between the retailers in terms of their bargaining power vis-à-vis the manufacturer, or their profitability from being the monopoly retailer.

1. Introduction

It is theoretically well documented that vertically related firms cannot coordinate competing retailers' pricing decisions through their bilateral supply contracts and this failure leads to a competitive market outcome. Hart and Tirole (1990), O'Brien and Shaffer (1992) and McAfee and Schwartz (1994) explain this coordination failure by the opportunism problem of the monopoly manufacturer in a setup where the manufacturer makes secret supply offers to competing retailers which hold "passive beliefs": retailers do not revise their beliefs about the other offers based on their offer. If the manufacturer approaches retailers sequentially and supply contracts are observable, the same opportunism exists against the second retailer.[1]

My paper contributes to this literature by illustrating the role of supply contracts with no commitment power in internalizing contracting externalities between one manufacturer and two competing retailers, and enabling the firms to implement the fully-integrated monopoly outcome, which I refer to as the *"efficient outcome"*. Similar to the literature, I first show that rich enough supply contracts solve the opportunism problem mentioned above. With full commitment, the first contracting parties

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[1]Segal (1999) generalizes this result to a setup of one principal and N agents in the presence of multilateral externalities and quantity forcing supply contracts. Assuming passive beliefs, de Fontenay and Gans (2007) show that secret bilateral negotiations between competing sellers and competing buyers lead to bilaterally efficient contracts which fail to implement the fully-integrated monopoly outcome.

have incentives to manipulate their contract to shift rent from the second contracting retailer, and these incentives distort the industry profit away from the efficient outcome. Without commitment, however, the first contract's strategic effect on the continuation of the game is eliminated since it is renegotiated from scratch in the event that there is no agreement with the second retailer, and so the firms implement the efficient outcome.

The focus of this paper is on rent shifting (that is, how the firstly negotiating parties should design their contract to extract as much surplus as possible from the second retailer). The previous literature on bilateral contracting seems to imply that a commitment not to renegotiate is key to extracting rent from the third parties (see e.g., Aghion and Bolton, 1987). I show however that renegotiation from scratch might be desirable to shift more rent from the second retailer. This difference is due to the fact that in my paper supply contracts cannot be made contingent on the second retailer's existence, whereas Aghion and Bolton (1987) allow the incumbent's contract to be contingent on the entrant's activity: the incumbent can commit to punish the buyer in case it purchases from the entrant, and through this commitment the incumbent and the buyer extract some rent from the more efficient entrant. In my setup with renegotiation from scratch, the first contracting parties could commit to implement their first-best contract in case of no agreement with the second retailer. Through this commitment, they can shift more rent from the second retailer when the second retailer has very high bargaining power and/or when the retailers are sufficiently differentiated and/or when the first retailer is sufficiently profitable in case it is the monopoly.[2] Intuitively, in those cases the first retailer gets a very high payoff when both retailers have an agreement, and so its losses from the existence of the second retailer are lower, which in turn induces lower gains from trade with the second retailer. In my benchmark with non-contingent non-renegotiable contracts, however, the first retailer's losses from the existence of a contract with the second retailer depend only on the level of externality (competition) between the retailers. Hence, in those cases, the manufacturer's gains from trading with the second retailer are lower in the game with renegotiation from scratch than the game without renegotiation.

I model the sequential bilateral negotiations as a three-stage game assuming first an exogenous order of negotiations. In stage 1, the manufacturer and the first retailer negotiate a contract. In stage 2, the manufacturer and the second retailer negotiate a contract. In stage 3, retailers with signed contracts compete in the product market. In addition, there are three key features of the model: (i) signed contract terms are observable to all parties at the start of the following stage, (ii) contracts include an up-front fee to be paid at the time the contract is signed and a tariff as a function of quantity purchased that is paid when trade takes place, and (iii) retailers have some bargaining power. I first solve the game without renegotiation and then the game where the first contract is renegotiated from scratch in the event that there is a disagreement with the second retailer. In the latter game, I assume that the upfront fee of the first contract is paid after the renegotiation stage, so if the parties renegotiate their initial contract from scratch, they renegotiate all terms. I finally analyze when the firstly contracting parties would prefer renegotiation from scratch.

My contractual framework with no commitment power uses the bilateral bargaining game in-

[2] Of course, this commitment is a less powerful rent shifting tool than allowing for contingent contracts (see Section 3.1).

troduced by Stole and Zwiebel (1996) and used also by de Fontenay and Gans (2007). My paper is different from those papers in many aspects. The first paper models sequential intra-firm wage bargaining between a firm and its employees where contracts are observable to third parties. It assumes unit contribution by each downstream player (employee) and so, for a given number of employees, there is no room for a distortion on the total profit. It shows that anticipating this wage bargaining, in equilibrium the firm hires inefficiently many employees in order to reduce their bargaining power. The second paper models sequential bilateral bargaining of a quantity and tariff between many sellers and many buyers with asymmetric information (as contract terms are not observable to third parties) and passive beliefs. Each downstream player (buyer) has a variable contribution (how much to sell) and the negotiating parties optimize over two dimensions: the total size and the distribution of profits. It shows that when there are externalities between buyers, the equilibrium outcome is bilaterally efficient, but fails to maximize the total surplus of all players. Similar to the latter, here downstream firms have variable contribution and exert externalities on each other, but I show that in equilibrium of the game with renegotiation the parties nevertheless implement the fully-integrated outcome. Different from de Fontenay and Gans (2007), in my setup the first contract can be used to influence the equilibrium contract of the second negotiation and anticipating this and the fact that the first contract cannot influence the disagreement payoffs of the second negotiation, the firstly contracting parties would set their contract to induce the fully-integrated outcome. In their setup, however, due to the passive beliefs assumption, a firm which receives an out-of-equilibrium offer would expect equilibrium outcomes in other negotiations and so only the offer maker is fully aware of its strategic play while dealing with competing firms, and anticipating this each offer maximizes the bilateral profit of the pair. In Stole and Zwiebel (1996) and de Fontenay and Gans (2007), there are no upfront payments and the equilibrium payoff distribution of the game is given by Shapley values of the underlying cooperative game and the order of negotiations do not matter. This is not the case in my setup where being the first negotiator is more profitable than the second, since the upfront fee of the first contract affects the gains from trading with the second retailer (as it is paid only if the second retailer is active and renegotiated otherwise) and so can be used as a tool to capture more rent from the second retailer.

The assumption of non-binding contracts can be motivated in several ways. First, it captures a vertical environment where supply contracts have no commitment power and a pairwise renegotiation could be started by one of the two parties anytime before retail competition takes place (Stole and Zwiebel, 1996, Theorem 2). Second, in practice contracts are often renegotiated or no longer valid in the event of a *material change of circumstances*. Hence, it is reasonable to assume that a contract signed by one retailer has no commitment power should the conditions of the contracting change radically by the absence of a rival retailer. Moreover, I show that the first contracting parties prefer their contract to have no commitment power under a large set of parameter values and it is always feasible to introduce a termination clause implementing this.

These results are robust to different types of retail competition (e.g., price vs quantity competition). If the renegotiation is not from scratch, but from status quo determined by the firstly signed contract, the strategic effects of the first contract are still present and lead to the same inefficient equilibrium outcome as in the game without renegotiation. The order of the sequential negotiations, the level of asymmetry between the retailers in terms of their bargaining power vis-à-vis the manufacturer or in terms of their profitability from being the monopoly retailer, do not affect the equilibrium quantities, which are always at the efficient level, but affects the distribution of the industry profit. The manufacturer prefers to negotiate first with the less powerful retailer, with which it has the larger disagreement payoff since, by this way, it could use its first agreement as a tool to capture more rent from the more powerful retailer.

The next section describes the main framework. Section 3 presents the main analysis. Section 4 presents two extensions. Section 5 concludes. All formal proofs are in the Appendix.

2. Framework

Consider a market where one manufacturer, U, negotiates sequentially bilateral supply contracts with two differentiated retailers, D_1 and D_2, for the distribution of its product. I assume that the manufacturer's production takes place after contract negotiations and upon the retailers' order. The timing of negotiations is as follows:

Stage 1: U and D_1 negotiate a supply tariff, T_1.

Stage 2: D_2 observes T_1 if it is signed, and then negotiates a supply tariff, T_2, with U.

Stage 3: D_1 observes T_2 if it is signed. The retailers that have signed a contract compete in the downstream market and transfers are made according to the relevant contract(s).

I assume that the outcome of each bilateral bargaining is given by the generalized Nash bargaining solution. From the negotiation between U and D_i, D_i gets a share, $\lambda_i \in [0, 1]$, of the gains from trade plus its disagreement payoff, which is assumed to be 0, and U gets $1 - \lambda_i$ of the gains from trade plus its disagreement payoff with D_i, which corresponds to U's payoff from trading only with D_i's rival, denoted by D_{-i}. Parameter λ_i measures the exogenous source of retailer i's bargaining power vis-à-vis the manufacturer and a higher λ_i means that the retailer gets more powerful in bargaining and so could capture a larger share of the gains from trade with the manufacturer. To simplify the analysis, I assume that after a failure of a negotiation round with one retailer, the manufacturer does not negotiate again with that retailer before retail competition takes place.[3]

The supply contract between U and D_i is $T_i(q) = S_i + t_i(q)$ for $q \geq 0$, where S_i is an up-front fee paid at the signature of the contract and $t_i(q)$ is a variable tariff as a function of quantity purchased.[4] I focus on a contract space in which there exists an equilibrium in every subgame, for example, a finite number of menus including an up-front payment, a tariff and a quantity, $T_i = \{(S_i, t_i, q_i)_n \ for \ n \geq 2\}$.[5]

[3]This assumption captures the fact that each negotiation round costs time and effort for the parties, and the firms, in general, may not want to invest more effort and time to negotiate with the party with which they have had a failure, at least within some period of time.

[4]Contract space is restricted in the sense that a retailer's contract cannot depend on its rival's contract. This assumption is motivated by the fact that contracts contingent on rivals' actions are difficult to enforce since they are regarded as horizontal cooperative agreements between competitors and therefore, are mostly outlawed by anti-trust authorities, at least in Europe and in the US.

[5]This technical assumption is necessary to outlaw contract spaces in which there exists no best-response quantity by a retailer. For instance, consider the subgame where the first negotiation fails. In the second negotiation, if out-of-equilibrium the parties sign contract $T_2 = \left\{ \begin{array}{c} 0 \ for \ q_2 < 1 \\ 1 \ for \ q_2 \geq 1 \end{array} \right\}$, retailer 2 wants to buy a quantity very close to 1, so there exists no best-response quantity to this contract. I thank Paul Heidhues for pointing this out.

The manufacturer has a constant production cost, c, the retailers incur the costs of purchasing inputs from U and, for simplicity, I assume that they have no additional costs from their activity. I do not specify the type of competition between the retailers; in particular, the results are valid both for quantity and price competition. Let $R_i(q_i, q_{-i})$ denote D_i's revenue when it sells q_i units and its rival sells q_{-i} units. The profits of D_i, U, and the industry are denoted, respectively, by π_i, π_U, and Π :

$$\pi_i(q_i, q_{-i}) = R_i(q_i, q_{-i}) - t_i(q_i) - S_i, \qquad \pi_U(q_1, q_2) = \sum_{i=1,2} [S_i + t_i(q_i) - cq_i],$$

$$\Pi(q_1, q_2) = \sum_{i=1,2} [R_i(q_i, q_{-i}) - cq_i].$$

I assume that each retailer's revenue is increasing in its own quantity and decreasing in its rival's quantity, respectively:

A1. (i) $0 < \partial_{q_i} R_i(q_i, q_{-i}) < \infty$, (ii) $\partial_{q_{-i}} R_i(q_i, q_{-i}) < 0$, *for* $i = 1, 2$, $q_i > 0$ *and* $q_{-i} \geq 0$.

Moreover, the following assumptions ensure the regularity conditions:

A2. (i) $\partial^2_{q_i} R_i(q_i, q_{-i}) < 0$, (ii) $\left|\partial^2_{q_i q_{-i}} R_i(q_i, q_{-i})\right| < \left|\partial^2_{q_i} R_i(q_i, q_{-i})\right|$, *for* $i = 1, 2$, $q_i > 0$ *and* $q_{-i} \geq 0$.

Let (q_1^M, q_2^M) denote the "monopoly" quantities which maximize the industry profit and Π^M denote the maximum industry profit, which I refer to as "fully-integrated monopoly profit" or "monopoly profit". The monopoly quantities serve as a benchmark against which contracting outcomes are compared, and the firms' failure to maximize their joint profit will be referred to as "inefficiency". If D_i is the unique active retailer, q_i^m denotes the-industry-profit-maximizing quantity and the maximized industry profit is denoted by Π_i^m. I allow the retailers to be asymmetric in their profitability from being the monopoly retailer, $\Pi_1^m \neq \Pi_2^m$.

Assumption $A1(ii)$ rules out an uninteresting case where two retail markets are independent, in which case there would be no externality between the retailers, and implies that $\Pi_1^m + \Pi_2^m > \Pi^M$. Moreover, I assume that the maximum industry profit is higher when both retailers are active rather than when one retailer is the monopoly:

A3. Retailers are imperfect substitutes: $\Pi^M > \Pi_i^m$ for $i = 1, 2$.

I consider two different scenarios regarding the commitment power of the firstly signed contract: (1) *full commitment*, which refers to the original game (without renegotiation), (2) *no commitment*, which refers to the game where the first contracting parties renegotiate their contract terms from scratch in the event of having no agreement with the second retailer, that is, there is a renegotiation stage after Stage 2 before Stage 3. In this case, I assume that the upfront fee is paid when the first contracting parties finalize their negotiations, that is, after the renegotiation stage.

I look for a subgame perfect Nash equilibrium outcome by solving the sequential game backwards for each commitment framework. At the end I compare the bilateral profits of the first retailer and manufacturer in equilibrium of the two commitment scenarios and illustrate their bilateral preference for the commitment power of their firstly signed contract.

3. Equilibrium analysis

The contract space I consider ensures the existence of an equilibrium in every subgame. Depending on the signed supply contracts, there are two types of retail equilibrium: monopoly retailer and retail competition. If D_i is the only retailer that has signed a contract with U, D_i becomes the monopoly retailer. If both retailers have signed a supply contract with U, it might still be the case that in equilibrium one retailer is inactive. For instance, if the manufacturer and one retailer set their contract in such a way as to cause the other retailer to shut down. For (sub-game) equilibrium contracts, quantities and profits, I use superscript ** if both retailers have signed a contract with the manufacturer, and superscript * when only one retailer has signed a contract. Moreover, π_U^{*i} denotes U's equilibrium profit when it has a contract only with D_i. In retail equilibrium, the retailers take signed contracts as given and set their quantity by maximizing their profit. Hence, q_i^* depends on $t_i(.)$ and (q_1^{**}, q_2^{**}) depend on the variable tariffs $t_1(.)$ and $t_2(.)$.

In case of a disagreement between U and D_1, U and D_2 want to maximize the industry profit, since through a fixed fee they can share the total profit. In this case, D_2 sells q_2^m and the resulting profits of D_2 and U are, respectively,

$$\pi_2^* = \lambda_2 \Pi_2^m, \quad \pi_U^{*2} = (1-\lambda_2)\Pi_2^m. \tag{1}$$

One tariff-quantity pair (t_2^*, q_2^*) such that $t_2^* = (1-\lambda_2)\Pi_2^m + cq_2^m$ and $q_2^* = q_2^m$, is sufficient to implement this outcome.

Under each commitment framework (full commitment and no commitment), I now characterize the equilibrium outcome (profits) of every subgame where the first retailer and the manufacturer sign contract T_1.

3.1. Full commitment benchmark: contracts without renegotiation

When renegotiation is not allowed, T_1 is implemented even in the event of D_2 having no agreement with U. Hence, U's disagreement payoff with D_2 depends on T_1 and is equal to the profit of U when D_1 is the monopoly retailer:

$$\pi_U^{*1} = S_1 + t_1(q_1^*) - cq_1^*. \tag{2}$$

Anticipating the retail equilibrium and taking T_1 as given, U and D_2 negotiate their contract. Their bilateral profit from signing a contract would be:

$$\begin{aligned} \pi_U^{**} + \pi_2^{**} &= \Pi\left(q_1^{**}, q_2^{**}\right) - \pi_1^{**} \\ &= R_2\left(q_2^{**}, q_1^{**}\right) - cq_2^{**} + S_1 + t_1(q_1^{**}) - cq_1^{**}. \end{aligned} \tag{3}$$

The optimal tariff of U and D_2 should maximize their bilateral profit. They sign a contract only if their maximized bilateral profit, which depends on $t_1(.)$, is greater than the manufacturer's disagreement payoff:

$$\max_{t_2(.)} \left[R_2(q_2^{**}, q_1^{**}) - cq_2^{**} + t_1(q_1^{**}) - cq_1^{**}\right] - \left[t_1(q_1^*) - cq_1^*\right] \geq 0. \tag{4}$$

In this case, through a fixed fee, they share the trade gains with respect to their relative bargaining power (where the quantities depend only on $t_1(.)$):

$$\begin{aligned}\pi_2^{**} &= \lambda_2\{R_2(q_2^{**}, q_1^{**}) - cq_2^{**} + t_1(q_1^{**}) - cq_1^{**} - [t_1(q_1^*) - cq_1^*]\},\\ \pi_U^{**} &= (1-\lambda_2)\{R_2(q_2^{**}, q_1^{**}) - cq_2^{**} + t_1(q_1^{**}) - cq_1^{**} - [t_1(q_1^*) - cq_1^*]\} + S_1 + t_1(q_1^*) - cq_1^*. \end{aligned} \tag{5}$$

Anticipating this, the bilateral profit of U and D_1 would be (where the quantities depend only on $t_1(.)$)

$$\pi_U^{**} + \pi_1^{**} = \Pi(q_1^{**}, q_2^{**}) - \lambda_2\{R_2(q_2^{**}, q_1^{**}) - cq_2^{**} + t_1(q_1^{**}) - cq_1^{**} - [t_1(q_1^*) - cq_1^*]\}. \tag{6}$$

First observe that if the second retailer has no bargaining power, $\lambda_2 = 0$, U and D_1 would like to implement the efficient quantities, (q_1^M, q_2^M), to maximize the total industry profit, $\Pi(q_1, q_2)$. To do so, they need to set $t_1(q_1^M) = R_1(q_1^M, q_2^M)$ and $t_1(q) = \infty$ for $q \neq q_1^M$, since then U and D_2 would like to trade q_2^M to maximize their bilateral payoff, (3). However, if they set $t_1(q_1^M) < R_1(q_1^M, q_2^M)$ and $t_1(q) = \infty$ for $q \neq q_1^M$, U and D_2 would like to trade a quantity greater than q_2^M (from (3)):

$$\partial_{q_2}\left[\pi_U(q_1^M, q_2^M) + \pi_2(q_1^M, q_2^M)\right] = -\partial_{q_2}\pi_1(q_1^M, q_2^M) = -\partial_{q_2}R_1(q_1^M, q_2^M) > 0. \tag{7}$$

In other words, setting the first retailer's conditional tariff at its anticipated revenue protects it against the opportunistic behavior of the second contracting parties.[6] Conditional tariffs work in a similar way to *liquidated damages* studied by Aghion and Bolton (1987): If the manufacturer sells more to the second retailer, it is punished by the loss of a substantial revenue since by a high enough conditional tariff the first retailer commits to opting out in case its rival sells more than expected. The first retailer wants to give all of its revenue as a conditional fee only if there is another tool through which the retailer could get its share over the gains from trade. An up-front payment made by the manufacturer to the first retailer, $S_1 < 0$, so called "slotting fee", would serve as such a tool.[7]

If the second retailer has some bargaining power, $\lambda_2 > 0$, U and D_1 face a trade-off. On one hand, they want to induce the efficient outcome by setting $t_1(q_1^M) = R_1(q_1^M, q_2^M)$. On the other hand, they want to minimize the rent of D_2 by maximizing U's disagreement payoff with D_2, $t_1(q_1^*) - cq_1^*$, and the latter is maximized at $t_1(q_1^*) = R_1(q_1^*, 0)$ and $q_1^* = q_1^m$. Suppose that they set $t_1(q_1^M) = R_1(q_1^M, q_2^M)$ and $t_1(q_1^m) = R_1(q_1^m, 0)$. But then, if D_2 has no agreement, the first retailer would prefer to order q_1^M since by doing so it gets positive variable revenue:

$$R_1\left(q_1^M, 0\right) - t_1\left(q_1^M\right) = R_1\left(q_1^M, 0\right) - R_1\left(q_1^M, q_2^M\right) > 0,$$

however, by ordering q_1^m, it would get zero. Hence, U and D_1 cannot induce the first-best outcome, (q_1^M, q_2^M), if both retailers are active and $q_1^* = q_1^m$.

If D_2 has no agreement with U, D_1 should sell q_1^* (by definition of q_1^*), and so must earn at least

[6] This role of conditional tariffs was first illustrated by de Fontenay and Gans (2005) in a framework where the manufacturer has all the bargaining power and supply contracts are two-part tariffs.

[7] Considering simultaneous supply offers by two competing retailers to one manufacturer, Marx and Shaffer (2007b) and Miklós-Thal, Rey, and Vergé (2010) show that conditional tariffs combined with slotting fees solve the opportunism problem.

as much as when selling the equilibrium quantity at which both retailers have a contract:

$$R_1\left(q_1^*, 0\right) - t_1\left(q_1^*\right) \geq R_1\left(q_1^{**}, 0\right) - t_1\left(q_1^{**}\right). \tag{8}$$

Since the bilateral profit of U and D_1, (6), decreases in $t_1\left(q_1^{**}\right) - t_1\left(q_1^*\right)$, the latter inequality should be binding in equilibrium, and so their bilateral profit would be

$$\pi_U^{**} + \pi_1^{**} = \Pi(q_1^{**}, q_2^{**}) - \lambda_2\left[R_2(q_2^{**}, q_1^{**}) + R_1\left(q_1^{**}, 0\right) - cq_1^{**} - cq_2^{**} - \Pi\left(q_1^*, 0\right)\right], \tag{9}$$

which is increasing in the industry profit when D_1 is the monopoly retailer, $\Pi\left(q_1^*, 0\right)$. Hence, in equilibrium, if D_1 is the monopoly retailer, U and D_1 would induce $q_1^* = q_1^m$. After replacing this, adding and subtracting $\lambda_2 R_1\left(q_1^{**}, q_2^{**}\right)$ into their bilateral profit, it is rewritten as

$$\pi_U^{**} + \pi_1^{**} = (1 - \lambda_2)\,\Pi\left(q_1^{**}, q_2^{**}\right) + \lambda_2\left(\Pi_1^m + \int_0^{q_2^{**}} \partial_{q_2} R_1(q_1^{**}, q_2)dq_2\right). \tag{10}$$

where the integral term is negative since the first retailer's revenue is decreasing in its rival's quantity, $A1$, and it corresponds to the revenue loss of retailer 1 if the second retailer sells its equilibrium quantity rather than being inactive. The optimal tariff of U and D_1 maximizes (10) subject to the constraint ensuring non-negative trade gains with the second retailer, that is, condition (4) after replacing $q_1^* = q_1^m$ and the binding (8)):

$$\Pi\left(q_1^{**}, q_2^{**}\right) \geq \Pi_1^m + \int_0^{q_2^{**}} \partial_{q_2} R_1(q_1^{**}, q_2)dq_2. \tag{11}$$

In equilibrium where both retailers sign a contract, this condition should not be binding, since then U and D_1 would prefer to cause the second negotiation fail and get Π_1^m rather than getting $\Pi\left(q_1^{**}, q_2^{**}\right) < \Pi_1^m$. But then, starting from the efficient quantities, $\left(q_1^M, q_2^M\right)$ where $\partial_{q_i}\Pi\left(q_1^M, q_2^M\right) = 0$, U and D_1 would have a profitable deviation if and only if

$$\partial_{q_1}\left(\pi_U^M + \pi_1^M\right) = \lambda_2 \int_0^{q_2^M} \partial^2_{q_1 q_2} R_1(q_1^M, q_2)dq_2 \neq 0,$$

which is the case whenever the second retailer has some bargaining power, $\lambda_2 > 0$, since the retailers are competing and their marginal revenue is affected by the rival's sales, so $\partial^2_{q_1 q_2} R_1(q_1, q_2) \neq 0$. If the marginal revenue of one retailer is increasing in the quantity of its rival, that is, if $\partial^2_{q_i q_{-i}} R_i(q_i, q_{-i}) > 0$, the quantities are strategic complements, and therefore U and D_1 prefer to trade more than q_1^M to increase U's outside option with D_2. But then U and D_2 would also trade more than q_2^M to maximize their bilateral profit, (3). Otherwise, that is, if $\partial^2_{q_i q_{-i}} R_i(q_i, q_{-i}) < 0$, the quantities are strategic substitutes and the retailers sell less than q_1^M and q_2^M, respectively. This characterizes the sub-game equilibrium outcome where both retailers sign a contract. The proposition summarizes these results:

Proposition 1. *Consider the game without renegotiation.*

- *When the second contracting retailer has no bargaining power, $\lambda_2 = 0$, the firms implement the fully-integrated monopoly quantities.*

- *When the second contracting retailer has some bargaining power, $\lambda_2 > 0$, the firms fail to implement the fully-integrated monopoly quantities in equilibrium. In the event that both retailers sign a contract, the equilibrium quantities would be above their monopoly level if the retailers' quantities are strategic complements, that is, if $\partial^2_{q_i q_{-i}} R_i(q_i, q_{-i}) > 0$. Otherwise, they would be below their monopoly level. If only retailer i is active, the equilibrium quantity will be $q_i^* = q_i^m$.*

The proposition shows that in general protecting the first retailer against the opportunism of the manufacturer is not enough to achieve the efficient outcome, since U and D_1 have incentives to use their variable tariff as a tool to shift rent from D_2 by increasing U's outside option in the second negotiation. In other words, they deviate from the monopoly quantities in order to get a larger share of a smaller pie. More generally speaking, Proposition 1 is the result of uninternalized contracting externalities in the negotiation between the manufacturer and the first retailer. This result is in parallel to the literature on vertical contracting with externalities.[8] Different from this literature, by focusing on sequential bilateral negotiations, I am able to distinguish the well-known opportunism problem the monopolist manufacturer faces (against the first contracting retailer) from the first contracting parties' incentives to distort their contract to shift more rent from the second retailer. In line with the previous literature, rich enough supply contracts allow the manufacturer to overcome the opportunism problem.[9] But even with general contracts, which are functions of own quantity, the latter distortion, which arises due to the strategic effects of the first contract on the manufacturer's disagreement payoff when bargaining with the second retailer, remains.

3.2. No commitment: contracts with renegotiation from scratch

Now suppose that in case of a disagreement between U and D_2, previously signed T_1 becomes null, and U renegotiates from scratch another contract with D_1. I assume that the upfront fee is paid when the first contracting parties finalize their negotiations, that is, after the renegotiation stage.

The disagreement payoff of U with D_2 is now determined by the renegotiation from scratch. The solution is symmetric to the case where the manufacturer has a contract only with the second retailer. Hence, if U and D_2 have no agreement, in the subgame equilibrium of the game with renegotiation from scratch, D_1 sells q_1^m and the resulting profits of D_1 and U are, respectively,

$$\pi_1^* = \lambda_1 \Pi_1^m, \quad \pi_U^{*1} = (1-\lambda_1)\Pi_1^m. \tag{12}$$

Different from the benchmark, here the first contract cannot be used as a way to influence U's outside option in the second negotiation since in the event of a disagreement between U and D_2, the first contract becomes null; U and D_1 renegotiate from scratch, as a result of which the manufacturer gets $(1-\lambda_1)\Pi_1^m$. To take into account this difference in the solution of the game, it is enough to replace $[t_1(q_1^*) - cq_1^*]$ by $[(1-\lambda_1)\Pi_1^m - S_1]$ in the benchmark analysis. This affects the Stage 2 negotiation

[8] See, for example, Hart and Tirole (1990), O'Brien and Shaffer (1992), McAfee and Schwartz (1994), Segal (1999), Segal and Whinston (2003), Martimort and Stole (2003), Marx and Shaffer (2007b).

[9] Two-part tariffs combined with retail price maintenance (RPM) would also solve the opportunism problem (O'Brien and Shaffer, 1992). However, RPM is forbidden in almost all OECD countries (OECD, 1997). Alternatively, supply contracts contingent on the rival retailers' contracts (or simply on their existence like in Miklós-Thal et al., 2010) would also solve the problem.

between U and D_2, (4), and changes their equilibrium payoffs given in (5). This in turn changes the equilibrium profits of U and D_1 given in (6). In the event that both retailers have a contract, the bilateral profit of U and D_1 would be (where the quantities depend on $t_1(.)$):

$$\pi_U^{**} + \pi_1^{**} = \Pi(q_1^{**}, q_2^{**}) - \lambda_2 \left[R_2(q_2^{**}, q_1^{**}) - cq_2^{**} + t_1(q_1^{**}) - cq_1^{**}\right] + \lambda_2 \left[(1-\lambda_1)\Pi_1^m - S_1\right] \tag{13}$$

If U and D_1 induce $t_1(q_1^{**}) = R_1(q_1^{**}, q_2^{**})$, by adjusting S_1 appropriately, they always internalize a fixed share, $(1-\lambda_2)$, of any increase in the industry profit that will eventually be generated. As a result, the bilateral incentives of U and D_1 coincide with maximizing the total industry profit.

When the firstly signed contract has no commitment power, U and D_1 do not have any incentives to distort the efficient outcome, since they cannot shift rent from the second retailer by manipulating their first contract. To induce the monopoly quantities, U and D_1 need to set $t_1(q_1^M) = R_1(q_1^M, q_2^M)$ and $t_1(q) = \infty$ for $q \neq q_1^M$, since then U and D_2 would like to trade q_2^M to maximize their bilateral profit (3) (see the discussion in the benchmark). This gives us the following proposition:

Proposition 2. *In equilibrium of the game with renegotiation from scratch, if both retailers sign a contract, the first contracting parties set $t_1^{**}(q_1^M) = R_1(q_1^M, q_2^M)$, and thereby induce the fully-integrated monopoly quantities.*

Now the question is whether in equilibrium both retailers have a contract. To answer this question, we need to characterize the equilibrium payoffs when both retailers have a contract and check whether any party might want to break its deal to get its corresponding outside option. The following condition is crucial in determining the equilibrium payoffs:

$$(P1): \Pi^M > \frac{(1-\lambda_2+\lambda_1\lambda_2)}{1-\lambda_2}\Pi_1^m - \frac{\lambda_1}{1-\lambda_1}\Pi_2^m.$$

Condition $(P1)$ holds if and only if the second retailer has sufficiently low bargaining power:

$$\lambda_2 < \frac{1}{1 + \frac{\lambda_1 \Pi_1^m}{\Pi^M - \Pi_1^m + \frac{\lambda_1}{1-\lambda_1}\Pi_2^m}} \equiv \widehat{\lambda_2}, \tag{14}$$

in which case I show that in equilibrium there are gains from trade between U and D_2, and thus D_2 earns positive profits as long as it has some bargaining power, $\lambda_2 > 0$. Otherwise, that is, if $\lambda_2 > \widehat{\lambda_2}$, D_2 has very high bargaining power, but it gets zero, since then D_1 and U shift all rent from D_2.

Lemma 1. *If $(1-\lambda_2)\Pi_2^m > (1-\lambda_1)\Pi_1^m$, condition $(P1)$ holds.*

Intuitively, if U finds having D_2 as the monopoly retailer (and thus getting $(1-\lambda_2)\Pi_2^m$) more profitable than having D_1 as the monopoly retailer (and getting $(1-\lambda_1)\Pi_1^m$), $(P1)$ holds and D_2 earns positive profits given that $\lambda_2 > 0$. The next result characterizes the equilibrium profits:

Proposition 3. *In equilibrium of the game with renegotiation from scratch, both retailers are active and a negative up-front fee in the first contract and a fixed fee in the second contract are used to share the fully-integrated monopoly profit.*

- *If* $(P1)$ *holds, that is,* $\lambda_2 < \widehat{\lambda_2}$,

$$\begin{aligned} S_1^{**} &= -\lambda_1 \left[\Pi^M + \frac{\lambda_2(1-\lambda_1)}{1-\lambda_2} \Pi_1^m - \Pi_2^m \right], \\ t_2^{**}(q_2^M) + S_2^{**} &= R_2(q_2^M, q_1^M) - \lambda_2 \left[(1-\lambda_1)\Pi^M + \lambda_1 \Pi_2^m - \frac{(1-\lambda_1)(1-\lambda_2+\lambda_1\lambda_2)}{1-\lambda_2} \Pi_1^m \right], \\ t_2^{**}(q_2^M) &\leq R_2(q_2^M, q_1^M) \end{aligned}$$

which lead to

$$\begin{aligned} \pi_1^{**} &= \lambda_1 \left[\Pi^M + \frac{\lambda_2(1-\lambda_1)}{1-\lambda_2} \Pi_1^m - \Pi_2^m \right], \\ \pi_2^{**} &= \lambda_2 \left[(1-\lambda_1)\Pi^M + \lambda_1 \Pi_2^m - \frac{(1-\lambda_1)(1-\lambda_2+\lambda_1\lambda_2)}{1-\lambda_2} \Pi_1^m \right], \\ \pi_U^{**} &= (1-\lambda_2) \left[(1-\lambda_1)\Pi^M + \lambda_1 \Pi_2^m - \frac{(1-\lambda_1)(1-\lambda_2+\lambda_1\lambda_2)}{1-\lambda_2} \Pi_1^m \right] + (1-\lambda_1)\Pi_1^m. \end{aligned}$$

- *If* $(P1)$ *does not hold,* $\lambda_2 \geq \widehat{\lambda_2}$, $S_1^{**} = -\left[\Pi^M - (1-\lambda_1)\Pi_1^m\right]$, $t_2^{**}(q_2^M) + S_2^{**} = R_2(q_2^M, q_1^M)$ *such that* $t_2^{**}(q_2^M) \leq R_2(q_2^M, q_1^M)$. *Hence,*

$$\pi_1^{**} = \Pi^M - (1-\lambda_1)\Pi_1^m, \quad \pi_2^{**} = 0, \quad \pi_U^{**} = (1-\lambda_1)\Pi_1^m.$$

The gains from trade between U and D_2 increases in the upfront fee of the first contract since the upfront fee is paid to U if D_2 has an agreement and is renegotiated from scratch otherwise. Besides, the upfront fee decreases in the second retailer's bargaining power. Intuitively, when the second retailer gets more powerful, the manufacturer's disagreement payoff with the first retailer decreases, which in turn increases the first retailer's equilibrium payoff, so decreases its upfront fee, making it more negative. When the second retailer has very high bargaining power, $\lambda_2 \geq \widehat{\lambda_2}$, the upfront fee of the first contract decreases to the point where there are no gains from trade between U and D_2, in which case U and D_1 gets all the industry profit, Π^M.

Observe that a negative up-front payment, that is, a slotting fee paid by U to D_1, at the signature of the first contract is a means to achieve the vertically integrated monopoly outcome as long as D_1 has some bargaining power: Negative S_1^{**} allows U and D_1 to share their bilateral profit once they set $t_1^{**}(q_1^M) = R_1(q_1^M, q_2^M)$.

In the second contract, it does not make a difference whether there is a conditional and/or an up-front fee since the first contract has been agreed upon when the second contract is negotiated, so there is no need to protect the second retailer against any opportunism. Hence, the sum of fees $t_2^{**}(q_2^M) + S_2^{**}$ are used to share the bilateral profits between U and D_2.

Proposition 3 illustrates that the manufacturer's contracts with the two retailers are different, reflecting their different bargaining positions, even in the event that they have symmetric "technologies." The first retailer gets a slotting fee and the second retailer pays a fixed fee. Interpreting the second retailer as the retailer with a shorter-term contract, the model would predict slotting fees in long-term but not in short-term contracts.

To illustrate further the role of the first contract's commitment power, I next analyze when the first contracting parties prefer renegotiation from scratch to no renegotiation.

3.3. Preferences over the commitment power of the first contract

Recall that the game without renegotiation could attain three different equilibrium outcomes:

1. If both retailers have signed a contract, the bilateral profit of U and D_1 would be (from (9))

$$(\pi_1^{**} + \pi_U^{**})^{NR} = \Pi(q_1^{**}, q_2^{**}) - \lambda_2 \left[\Pi(q_1^{**}, q_2^{**}) - \left(\Pi_1^m + \int_0^{q_2^{**}} \partial_{q_2} R_1(q_1^{**}, q_2) dq_2 \right) \right]. \quad (15)$$

2. If only the second retailer has signed a contract, the bilateral profit of U and D_1 would be $(1 - \lambda_2)\Pi_2^m$ (from (1)).
3. If only the first retailer has signed a contract, the bilateral profit of U and D_1 would be Π_1^m (as $q_1^* = q_1^m$).

In the game with renegotiation from scratch, their bilateral profit is given by Proposition 3. In this case, as shown previously that in equilibrium both retailers sign a contract, and therefore U and D_1 prefer renegotiation from scratch to the cases of a monopoly retailer without renegotiation (the cases 2 and 3). Moreover, when the second retailer has very high bargaining power, $\lambda_2 \geq \widehat{\lambda_2}$, U and D_1 gets the maximum industry profit, Π^M, and therefore prefer renegotiation from scratch to the game without renegotiation. When the second retailer is not so powerful, $\lambda_2 < \widehat{\lambda_2}$, U and D_1 gets

$$(\pi_1^{**} + \pi_U^{**})^R = \Pi^M - \lambda_2 \left[\Pi^M - \left((1 - \lambda_1)\Pi_1^m + \lambda_1 \left[\Pi^M + \frac{\lambda_2(1 - \lambda_1)}{1 - \lambda_2} \Pi_1^m - \Pi_2^m \right] \right) \right]. \quad (16)$$

We now compare this profit to their bilateral profit in the game without renegotiation where both retailers have a contract, equation (15). Each of these profits is equal to the industry profit minus the share of the second retailer over its gains from trade with the manufacturer. These gains are equal to the industry profit minus the sum of the manufacturer's disagreement payoff with the second retailer and the first retailer's profit. Lower trade gains between U and D_2 leads to a lower rent for D_2 and so a higher bilateral profit for U and D_1. Hence, U and D_1 prefer the game where the trade gains between U and D_2 are minimum and the industry profit is maximum.

Without renegotiation, U and D_1 have incentives to distort the total industry profit away from the efficient outcome, so $\Pi(q_1^{**}, q_2^{**}) < \Pi^M$ (from Proposition 1). Recall that in equilibrium the first retailer's tariff should satisfy (8) as an equality:

$$t_1 (q_1^{**}) - t_1 (q_1^*) = R_1 (q_1^{**}, 0) - R_1 (q_1^*, 0), \quad (17)$$

to ensure that the first retailer orders its equilibrium quantity conditional on the event that D_2 has no contract. This implies that U has to leave more profit to the first retailer in case D_2 has no agreement with the manufacturer than the case D_2 has an agreement:

$$\pi_1 (q_1^*, 0) = R_1 (q_1^*, 0) - t_1 (q_1^*) - S_1 > \pi_1 (q_1^{**}, q_2^{**}) = R_1 (q_1^{**}, q_2^{**}) - t_1 (q_1^{**}) - S_1. \quad (18)$$

After replacing (17) into (18), the difference between these profits is equal to the integral term in (15):

$$\pi_1\left(q_1^*,0\right)-\pi_1\left(q_1^{**},q_2^{**}\right)=-\int_0^{q_2^{**}}\partial_{q_2}R_1(q_1^{**},q_2)dq_2>0,$$

which increases the gains from trade between U and D_2, and therefore decreases U's bilateral profit with D_1. Intuitively, the reduction of retailer 1's profit due to U's agreement with retailer 2 makes it more attractive for U to trade with D_2, and therefore reduces the bilateral profit of U and D_1 when both retailers are active. Moreover, the upfront fee of the first contract does not impact U and D_1's bilateral payoff, as it is paid regardless of whether the second retailer has a contract.

With renegotiation from scratch, however, U and D_1 implement the efficient outcome, Π^M. They decide bilaterally how much to trade if D_2 has no contract and D_1 gets its share over the maximized bilateral profit, that is, $\lambda_1\Pi_1^m$. The manufacturer's disagreement payoff with D_2 would therefore be $(1-\lambda_1)\Pi_1^m$. The upfront fee of the first contract is paid if the second retailer has an agreement and renegotiated from scratch otherwise. The upfront fee therefore increases the trade gains between U and D_2 decreasing the bilateral profit of U and D_1. Hence, the reduction of retailer 1's profit due to U's agreement with retailer 2,

$$\pi_1\left(q_1^m,0\right)-\pi_1\left(q_1^M,q_2^M\right)=\lambda_1\Pi_1^m-\lambda_1\left[\Pi^M+\frac{\lambda_2(1-\lambda_1)}{1-\lambda_2}\Pi_1^m-\Pi_2^m\right],$$

increases the trade gains between U and D_2 decreasing the bilateral profit of U and D_1.

Depending on the parameter values, $\lambda_1,\lambda_2,\Pi_1^m,\Pi_2^m,\Pi^M$, U and D_1 may prefer renegotiation from scratch to the game without renegotiation. For instance, when U has all bargaining power vis-à-vis both retailers, $\lambda_1=\lambda_2=0$, U captures all industry profit, and so sets the contracts to achieve the maximum industry profit in both cases. When the first retailer has no bargaining power, $\lambda_1=0$, but the second retailer has some, $\lambda_2>0$, U and D_1 prefer renegotiation from scratch since in this case the manufacturer's gains from trade with the second retailer is at its minimum level:

$$\pi_1\left(q_1^m,0\right)-\pi_1\left(q_1^M,q_2^M\right)=0<\pi_1\left(q_1^*,0\right)-\pi_1\left(q_1^{**},q_2^{**}\right),$$

and the industry profit is maximized. When the first retailer has all bargaining power and the second retailer has some, $\lambda_1=1$ and $\lambda_2>0$, U and D_1 prefer renegotiation from scratch if the retailers are sufficiently differentiated:

$$\Pi_1^m+\Pi_2^m-\Pi^M\leq-\int_0^{q_2^{**}}\partial_{q_2}R_1(q_1^{**},q_2)dq_2$$

since in this case the first retailer's equilibrium profit, $\pi_1\left(q_1^M,q_2^M\right)$, would be sufficiently high leading to lower trade gains between U and D_2 compared to the game without renegotiation. In general, when the second retailer's bargaining power is sufficiently high, the first retailer's equilibrium profit with renegotiation would be high enough to make renegotiation profitable for U and D_1.

Proposition 4. *The first contracting parties prefer contracting with renegotiation from scratch if the second retailer has sufficiently high bargaining power (for high enough λ_2) and/or if the retailers are sufficiently differentiated (when $\Pi_1^m+\Pi_2^m-\Pi^M$ is sufficiently small) and/or the first retailer is* *sufficiently profitable when it is the monopoly (for high enough* $(1-\lambda_1)\Pi_1^m$*):*

$$\lambda_2 \geq \frac{1}{1+\frac{(1-\lambda_1)\Pi_1^m}{\Pi_1^m+\Pi_2^m-\Pi^M}} \equiv \overline{\lambda_2}.$$

Intuitively, in those cases, the gains from trade between U and D_2 are lower with renegotiation than without renegotiation, and so the rent left to D_2 is lower with renegotiation. This is because in the game with renegotiation, the first retailer's equilibrium profit increases in the bargaining power of the second retailer, in the degree of differentiation between the retailers and in the manufacturer's disagreement payoff with the second retailer. Hence, the first retailer's loss from the existence of a contract with the second retailer, $\pi_1(q_1^m, 0) - \pi_1(q_1^M, q_2^M)$, decreases in these terms making it less attractive for U to trade with D_2. However, in the game without renegotiation, the first retailer's loss from an agreement with the second retailer, $\pi_1(q_1^*, 0) - \pi_1(q_1^{**}, q_2^{**})$, does not depend on the bargaining power of the second retailer or on the manufacturer's disagreement payoff with the second retailer, but increases in the competitive externality of the second retailer on the first retailer, $|\partial_{q_2} R_1|$. Observe that when the first retailer has some bargaining power, threshold $\overline{\lambda_2}$ lies below the threshold above which U and D_1 captures the maximum industry profit with renegotiation: $\overline{\lambda_2} < \widehat{\lambda_2}$ (since $\Pi^M > \Pi_1^m > 0$), so there exists some intermediate values for the bargaining power of the second retailer, for $\lambda_2 \in (\overline{\lambda_2}, \widehat{\lambda_2}]$, such that U and D_1 prefer contracting with renegotiation from scratch even if they do not capture all industry profit.

The result that renegotiation might be desirable to shift more rent from the second retailer seems to be contrary to the common intuition that renegotiation is bad for rent shifting from the third parties. For instance, Aghion and Bolton (1987) show that when the incumbent can commit to punish the buyer in case it purchases from the entrant, the incumbent and the buyer shift some rent from the more efficient entrant. This difference is due to the fact that their paper allows the incumbent's contract to be contingent on the entrant's activity, while I consider supply contracts that are functions of own quantity and cannot be contingent on the second retailer's existence. On the other hand, allowing renegotiation from scratch in case of a disagreement with the second retailer includes an implicit contingency in the supply contract, since renegotiation from scratch enables the first contracting parties to commit to implement their best-reply contract conditional on the second retailer having no contract. This eliminates the strategic effects of the first contract on the continuation of the game and gives the manufacturer considerable disagreement payoff while negotiating with the second retailer if bargaining power vis-a-vis the first retailer is high. Hence, when bilateral contracts cannot be made contingent on the rival's activity, allowing renegotiation from scratch in case of a disagreement with the rival can enable the first contracting parties to shift more rent from the second retailer. Of course, renegotiation from scratch is a less powerful rent shifting tool than contingent contracts. If I allowed contracts to be contingent on the rival's activity, the first contracting parties would be able to implement the efficient market outcome and extract all rent from the second retailer, that is, contingent contracts would dominate renegotiation from scratch. Intuitively, by the contingency of their contract, in the event that the second retailer has no agreement, they could commit to give the manufacturer very high payoff (higher than what it would get under renegotiation from scratch) and thereby reduce the gains from trading with the second retailer to zero. When both retailers have a contract, this does not distort the market outcome, since they would set different terms to be applied in that case (see Bedre-Defolie, 2011).

4. Extensions

4.1. Partial commitment: contracts with renegotiation, but not from scratch

Consider the framework where the first contracting parties could renegotiate their contract in the event of the second retailer being out of the game. Different from the no commitment case, here I assume that renegotiation is from the status quo which is given by the payoffs under the firstly signed contract, T_1:

$$\begin{aligned} \pi_U^{*1}(T_1) &= S_1 + t_1(q_1^*) - cq_1^*, \\ \pi_1^*(T_1) &= R_1(q_1^*, 0) - S_1 - t_1(q_1^*). \end{aligned} \tag{19}$$

Hence, these payoffs determine the respective outside options of U and D_1 in renegotiation. They would like to renegotiate a new contract as long as they could improve their bilateral profit. When $q_1^* \neq q_1^m$, they renegotiate a new contract, say T_1^m, inducing q_1^m and thereby leading to the maximum bilateral profit, Π_1^m. Their payoffs from renegotiation would then be

$$\begin{aligned} \pi_U^{*1}(T_1^m) &= (1-\lambda_1)\left[\Pi_1^m - \Pi(q_1^*, 0)\right] + \pi_U^{*1}(T_1) \\ \pi_1^*(T_1^m) &= \lambda_1\left[\Pi_1^m - \Pi(q_1^*, 0)\right] + \pi_1^*(T_1) \end{aligned} \tag{20}$$

To take into account this difference in the solution of the game, it is enough to replace $[t_1(q_1^*) - cq_1^*]$ by $\left[\pi_U^{*1}(T_1^m) - S_1\right]$ in the benchmark analysis. In the event that both retailers have signed a contract, the bilateral profit of U and D_1 would be

$$\pi_U^{**} + \pi_1^{**} = \Pi(q_1^{**}, q_2^{**}) - \lambda_2\left\{R_2(q_2^{**}, q_1^{**}) - cq_2^{**} + t_1(q_1^{**}) - cq_1^{**} - \left[\pi_U^{*1}(T_1^m) - S_1\right]\right\},$$

which can be re-written (by replacing the value of $\pi_U^{*1}(T_1^m)$ from (20) and (19)) as

$$\begin{aligned} \pi_U^{**} + \pi_1^{**} &= \Pi(q_1^{**}, q_2^{**}) - \lambda_2\left\{R_2(q_2^{**}, q_1^{**}) - cq_2^{**} + t_1(q_1^{**}) - cq_1^{**} - [t_1(q_1^*) - cq_1^*]\right\} \\ &\quad + \lambda_2(1-\lambda_1)\left[\Pi_1^m - \Pi(q_1^*, 0)\right]. \end{aligned}$$

Compared to their bilateral profit in the game without renegotiation, (6), there is an extra term, $\lambda_2(1-\lambda_1)\left[\Pi_1^m - \Pi(q_1^*, 0)\right]$, arising from renegotiation and increasing their bilateral profit. Intuitively, renegotiation increases the disagreement payoff of U with D_2, and therefore increases the bilateral profit of U and D_1. Similar to the game without renegotiation, the condition which ensures that D_1 would order q_1^* in case D_2 has no agreement with U, (8), must be binding as an equality:

$$t_1(q_1^{**}) - t_1(q_1^*) = R_1(q_1^{**}, 0) - R_1(q_1^*, 0).$$

The bilateral profit of U and D_1 should therefore be equal to

$$\begin{aligned} \pi_U^{**} + \pi_1^{**} &= \Pi(q_1^{**}, q_2^{**}) - \lambda_2\left\{R_2(q_2^{**}, q_1^{**}) + R_1(q_1^{**}, 0) - cq_1^{**} - cq_2^{**} - \Pi(q_1^*, 0)\right\} \\ &\quad + \lambda_2(1-\lambda_1)\left[\Pi_1^m - \Pi(q_1^*, 0)\right], \end{aligned}$$

which is increasing in $\Pi\left(q_1^*, 0\right)$. Hence, should D_2 have no agreement, U and D_1 would trade $q_1^* = q_1^m$. When both retailers have a contract, the bilateral profit of U and D_1 would therefore be

$$\pi_U^{**} + \pi_1^{**} = \Pi(q_1^{**}, q_2^{**}) - \lambda_2\left[R_2(q_2^{**}, q_1^{**}) + R_1\left(q_1^{**}, 0\right) - cq_1^{**} - cq_2^{**} - \Pi\left(q_1^*, 0\right)\right],$$

which is equivalent to their bilateral profit in the game without renegotiation in case both retailers have a contract, (9). Moreover, when only one retailer has signed a contract, the equilibrium outcome of the game with partial commitment coincides with the equilibrium outcome of the game without renegotiation. Hence, this proves that

Proposition 5. *When there is partial commitment, that is, when the first contract can be renegotiated from status-quo, but not from scratch, in case of the second retailer having no agreement, the equilibrium outcome is the same as the equilibrium outcome without renegotiation.*

4.2. The order of sequential negotiations

I analyze how the results would change if U negotiated first with D_2 and then with D_1. In this case, the solution of the game is symmetric to that of the original framework (where D_1 negotiates first with U). I obtain results symmetric to those of Propositions 2 and 3 (exchanging the roles between D_1 and D_2). Symmetric to $(P1)$, the following condition will be crucial in determining equilibrium payoffs:

$$(P2) : \Pi^M > \frac{(1-\lambda_1+\lambda_1\lambda_2)}{1-\lambda_1}\Pi_2^m - \frac{\lambda_2}{1-\lambda_2}\Pi_1^m.$$

Proposition 6. *If U negotiates first with D_2, in equilibrium with renegotiation from scratch, both retailers are active and implement the fully-integrated monopoly outcome. The equilibrium payoffs can be of two types: If $(P2)$ holds, all parties get some positive profits as long as they have some bargaining power. Otherwise, D_1 gets 0 whereas D_2 gets the fully-integrated monopoly profit after leaving U its outside option.*

The order of the sequential negotiations does not affect the equilibrium quantities, which are always at the monopoly level, and only affects the distribution of the monopoly profit.

Now I add one stage at the beginning of the game, in which U decides with which retailer to negotiate first. Comparing U's payoff when D_1 is the first negotiating retailer with U's payoff when D_2 is the first negotiating retailer, gives us the following result:

Proposition 7. *In the game with renegotiation from scratch, U prefers to negotiate first with the retailer with which it gets the smaller payoff when this retailer is the monopoly, that is, if $(1-\lambda_2)\Pi_2^m > (1-\lambda_1)\Pi_1^m$, U strictly prefers to negotiate first with D_1; otherwise, U prefers to negotiate first with D_2.*

Intuitively, U wants to take advantage of a greater outside option in the first negotiation. This is similar to the finding of Marx and Shaffer (2007a) in an inverse industry structure where a common agent retailer prefers to negotiate first with the weaker supplier to improve its bargaining position at the first stage.[10]

Comparing the profit of D_1 when it is the first negotiator (given in Proposition 3) and when it is the second (given in the proof of Proposition 7), one can show that D_1 always prefers to be the first in negotiations (and, by symmetry, the same is true for D_2). When (P1) does not hold, D_1 gets the maximum industry profit if it is the first contracting retailer, so, in this case, it is straightforward that D_1 prefers to be the first. However, in this case, we have $(1-\lambda_2)\Pi_2^m \leq (1-\lambda_1)\Pi_1^m$ (by Lemma 1), which implies that the manufacturer prefers to start its negotiation with the second retailer (by Proposition 7). This comparison is not straightforward if (P1) holds. Figure 1[11] illustrates the comparison between the gains from being the first contracting retailer and the manufacturer's preferred order of negotiations. The red and blue curves represent, respectively, the gains of D_1 and D_2, from being the first negotiator. The black curve shows the gains/losses of the manufacturer from starting its negotiations with D_1. The green line is the difference between the profits of the manufacturer when the second retailer is the monopolist and when the first retailer is the monopolist, $(1-\lambda_2)\Pi_2^m - (1-\lambda_1)\Pi_1^m$. The manufacturer prefers to negotiate first with D_1 if and only if the green line is above zero (as proven in Proposition 7). In this case, the bilateral profits of the manufacturer and D_1 (the sum of the values of the black and red curves) might be below the gains of D_2 from being the first in negotiations.

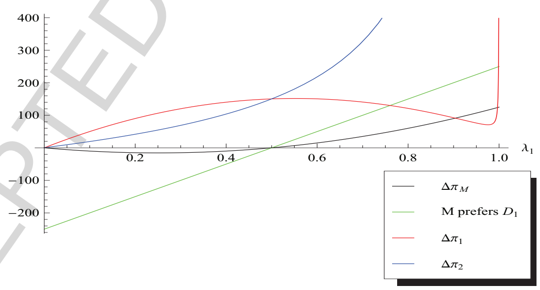

Figure 1: Comparison of the preferences on the order of negotiations.

5. Conclusion

This paper analyzes sequential bilateral contract negotiations between one manufacturer and two competing retailers where supply contracts are allowed to be general functions of own quantity, but cannot be made contingent on the rival's quantity. The analysis of supply contracts with full commitment shows that when the second contracting retailer has some bargaining power vis-à-vis the manufacturer, the firms fail to achieve the fully-integrated monopoly outcome since the first contracting parties distort their contract (and so their quantity) to shift more rent from the second retailer. If contracts have no commitment power, that is, when the first retailer and the manufacturer

[10] Another difference from my setup is that the authors consider supply contracts contingent on the structure of the industry: exclusive dealing vs up-stream competition.

[11] I draw Figure 1 for parameter values $\Pi^M = 600$, $\Pi_1^m = \Pi_2^m = 500$ and $\lambda_2 = 0.5$.

are allowed to renegotiate their contract from scratch in the event that the second retailer has no agreement, they could eliminate the first contract's strategic effect on the continuation of the game, and thereby implement the monopoly outcome, often with full rent extraction from the second retailer.

The first contracting parties prefer renegotiation from scratch to full commitment when the second retailer has very high bargaining power and/or when the retailers are sufficiently differentiated and/or the manufacturer's disagreement payoff with the second retailer is sufficiently high. Intuitively, renegotiation from scratch enables the first contracting parties to commit to implement their first-best contract in case of the second retailer having no agreement. In those cases this commitment ensures very high payoff to the first retailer when both retailers are active and thereby extract more rent from the second retailer.

These results are robust to type of retail competition, the level of differentiation between the retailers, the order of sequential negotiations and the level of asymmetry between retailers in terms of their bargaining power or profitability from being the monopoly retailer. If the renegotiation is not from scratch, but from status quo determined by the firstly signed contract, the equilibrium outcome would be the same as the game without renegotiation. Finally, I show that the manufacturer prefers to negotiate first with the retailer with which it gets the smaller payoff when this retailer is the monopoly.

The exercise of retailers' buyer power has given rise to many (complex) forms of payments made by suppliers to retailers, e.g., "slotting fees" to place products on the retailers' shelves, many "types of variable promotional support and any overriders that are linked to volume of sales, including growth targets."(see Competition Commission, 2000, 2008.) My analysis of supply contracts with no commitment show that when retailers have some bargaining power, the first contracting retailer receives its profit from the manufacturer through an upfront fee, so called "slotting fee", and claims to pay all its variable profit to the manufacturer via a fixed fee conditional on the second retailer selling at the (fully-integrated) monopoly price. By this way, the first contracting retailer is protected against the opportunism of the manufacturer when it is negotiating with the second retailer. The second retailer, however, pays a fixed fee to the manufacturer, as it does not face the opportunism of the manufacturer. Hence, my analysis would predict that slotting fees are used in long-term contracts, but not in short-term contracts.

Paying a substantial slotting fee to the first retailer seems to be a very risky strategy for the manufacturer, however it arises as a result of the first retailer's substantial bargaining power and so the manufacturer cannot avoid taking such risk in bilateral negotiations with strong retailers. The evidence suggests that large amounts of slotting fees are indeed paid before the good is actually purchased and "do not commit the store operator to any particular level of purchases."(see Federal Trade Commission, 2001, p.11.)

An interesting research agenda is to extend this analysis to account for implications of upstream competition. Intuitively, all strategic effects of early signed supply contracts could be eliminated if the firms are assumed to renegotiate from scratch in case one bilateral negotiation ends with a disagreement. A full-fledged analysis is required to prove this intuitive argument.

Appendix

Proof of Proposition 2. Consider an equilibrium, (T_1^c, T_2^c), where both retailers sign a contract and the industry profit, Π^c, is lower than the vertically integrated monopoly profit, Π^M. Let the payoffs of D_1, D_2 and U be respectively π_1^c, π_2^c, and π_U^c. (T_1^c, T_2^c) could be the equilibrium contracts only if each retailer gets non-negative profits, $\pi_1^c, \pi_2^c \geq 0$, and U gets at least what it would get by failing one negotiation and focusing on the other retailer. If the negotiation with D_1 fails, U deals only with D_2 and gets $(1-\lambda_2)\Pi_2^m$. If the negotiation with D_2 fails, the first contract with D_1 becomes null, U and D_1 renegotiate from scratch, and thus U gets $(1-\lambda_1)\Pi_1^m$. The equilibrium profit of U should be at least as much as its outside options, $\pi_U^c \geq (1-\lambda_2)\Pi_2^m$ and $\pi_U^c \geq (1-\lambda_1)\Pi_1^m$.

At (T_1^c, T_2^c), the gains from trade between U and D_2, that is, their bilateral profit, $\Pi^c - \pi_1^c$, minus the disagreement payoff of U, $(1-\lambda_1)\Pi_1^m$, must be non-negative:

$$\Pi^c - \pi_1^c - (1-\lambda_1)\Pi_1^m \geq 0$$

since otherwise there would be no contract between them. In Stage 2, U and D_2 share the gains from trade with respect to their bargaining power:

$$\begin{aligned} \pi_2^c &= \lambda_2 \left(\Pi^c - \pi_1^c - (1-\lambda_1)\Pi_1^m\right), \\ \pi_U^c &= (1-\lambda_2)\left(\Pi^c - \pi_1^c - (1-\lambda_1)\Pi_1^m\right) + (1-\lambda_1)\Pi_1^m. \end{aligned}$$

Let ε be a positive number satisfying $\varepsilon < \Pi^M - \Pi^c$. Instead of T_1^c, suppose that U and D_1 negotiated T_1^d to induce q_1^M such that

$$S_1^d = -(\pi_1^c + \varepsilon), \; t_1^d(q) = \left\{ \begin{array}{ll} R_1(q_1^M, q_2^M) & if\ q_1 = q_1^M \\ \infty & if\ q_1 \neq q_1^M \end{array} \right\}.$$

Once T_1^d is signed, if U and D_2 trade something different than q_2^M, the industry profit will be lower than Π^M. If $q_2 > q_2^M$, D_1's profit is $\pi_1^c + \varepsilon$ and D_1 is inactive, since otherwise it would pay fee $t_1^d(q_1^M)$, which is greater than its revenue $R_1(q_1^M, q_2)$, since $\partial_{q_2} R_1 < 0$ (by A1). If $q_2 < q_2^M$, D_1 is active and its profit is strictly greater than $\pi_1^c + \varepsilon$. Since the payoffs of U and D_2 are both increasing in the industry profit and decreasing in D_1's profit, they prefer to negotiate T_2^d, which induces q_2^M, to achieve the industry profit of Π^M and to leave the minimum to D_1, which is $\pi_1^d = \pi_1^c + \varepsilon$. Under (T_1^d, T_2^d) both retailers would be active, and the three firms obtain (replacing Π^c with Π^M, and π_1^c with $\pi_1^d = \pi_1^c + \varepsilon$ in the above payoff expressions):

$$\begin{aligned} \pi_1^d &= \pi_1^c + \varepsilon, \qquad \pi_2^d = \lambda_2 \left(\Pi^M - \pi_1^c - \varepsilon - (1-\lambda_1)\Pi_1^m\right), \\ \pi_U^d &= (1-\lambda_2)\left(\Pi^M - \pi_1^c - \varepsilon - (1-\lambda_1)\Pi_1^m\right) + (1-\lambda_1)\Pi_1^m. \end{aligned}$$

Since $0 < \varepsilon < \Pi^M - \Pi^c$, I get $\pi_1^d > \pi_1^c$, $\pi_2^d > \pi_2^c$ and $\pi_U^d > \pi_U^c$. By assumption, U and D_2 had no incentives to fail their negotiation initially (that is, they negotiate T_2^c once T_1^c is signed). Since they both get more under (T_1^d, T_2^d) than under (T_1^c, T_2^c), they do not fail their negotiation once T_1^d is signed, either. But then, U and D_1 prefer (T_1^d, T_2^d) to (T_1^c, T_2^c) since they both get strictly higher profits under (T_1^d, T_2^d), that is, (T_1^c, T_2^c) cannot be an equilibrium. Therefore, if in equilibrium both retailers sign a contract with U, it must be the case that both retailers are active and achieve the monopoly outcome: $q_i = q_i^M$.

Furthermore, if in equilibrium both retailers are active, we should have $t_1(q_1^M) \leq R_1(q_1^M, q_2^M)$, since otherwise D_1 would not be active. Suppose that $t_1(q_1^M) < R_1(q_1^M, q_2^M)$. Given $q_1 = q_1^M$ and $t_1(q_1^M) < R_1(q_1^M, q_2^M)$, the bilateral profits of U and D_2 would be $\Pi(q_1^M, q_2) - R_1(q_1^M, q_2) + t_1(q_1^M) + S_1$. But then, starting from $q_2 = q_2^M$, U and D_2 would have an incentive to increase q_2, since increasing q_2 above q_2^M decreases the industry profit by only a second-order effect, $\partial_{q_2}\Pi(q_1^M, q_2^M) = 0$, while it decreases D_1's revenue by a first-order effect, $\partial_{q_2} R_1(q_1^M, q_2^M) < 0$ (by A1). Hence, in equilibrium where both retailers sign a contract, it must be the case that $t_1(q_1^M) = R_1(q_1^M, q_2^M)$.

Proof of Lemma 1. Suppose that $(P1)$ does not hold and that $(1-\lambda_2)\Pi_2^m > (1-\lambda_1)\Pi_1^m$, these inequalities are consistent if $\Pi^M < (1-\lambda_1)\Pi_1^m$ which can never be satisfied since $\Pi^M > \Pi_1^m$.

Proof of Proposition 3. Proposition 2 shows that in equilibrium if both retailers sign a contract, D_1 and D_2 sell, respectively, (q_1^M, q_2^M), and we have $t_1(q_1^M) = R_1(q_1^M, q_2^M)$. Suppose, wlog, that $t_2(q_2^M) = R_2(q_2^M, q_1^M)$ since what matters for U and D_2 is the sum of the fees, $t_2(q_2^M) + S_2$, rather than the individual values of $t_2(q_2^M)$ and S_2. Given these, I simplify the analysis by assuming that: (i) Each contract consists only of an up-front payment, (ii) each retailer decides whether to sign a contract or not, and (iii) if both retailers have a contract, they sell the monopoly quantities, (q_1^M, q_2^M). The payoffs are then

$$\pi_i = -S_i \quad for \quad i = 1, 2, \qquad \pi_U = \Pi^M + S_1 + S_2. \tag{.1}$$

Consider the negotiation between U and D_2 with the new value of D_2's disagreement profit with U, that is, replace $[t_1(q_1^*) - cq_1^*]$ by $[(1-\lambda_1)\Pi_1^m - S_1]$ in (4). Given T_1 is signed, U and D_2 choose between two possibilities: either they fail their negotiation, in which case their bilateral profit is $(1-\lambda_1)\Pi_1^m$, or they negotiate a contract, in which case their bilateral profit is $\Pi^M + S_1$. I define Condition 1 as follows:

$$Condition\ 1 : \Pi^M + S_1 - (1-\lambda_1)\Pi_1^m \geq 0.$$

If Condition 1 holds, U and D_2 prefer to reach an agreement and set S_2 by

$$\max_{S_2} \left[\Pi^M + S_1 + S_2 - (1-\lambda_1)\Pi_1^m\right]^{1-\lambda_2} [-S_2]^{\lambda_2}.$$

The first-order condition then characterizes S_2 as a function of S_1 :

$$S_2^{**}(S_1) = -\lambda_2 \left[\Pi^M + S_1 - (1-\lambda_1)\Pi_1^m\right], \tag{.2}$$

which yields the payoffs

$$\begin{aligned} \pi_1^{**}(S_1) &= -S_1, \ \pi_2^{**}(S_1) = \lambda_2 \left[\Pi^M + S_1 - (1-\lambda_1)\Pi_1^m\right], \\ \pi_U^{**}(S_1) &= (1-\lambda_2)\left[\Pi^M + S_1 - (1-\lambda_1)\Pi_1^m\right] + (1-\lambda_1)\Pi_1^m. \end{aligned}$$

If Condition 1 does not hold, the negotiation between U and D_2 breaks down, in which case the payoffs are

$$\pi_1^* = \lambda_1 \Pi_1^m, \pi_2 = 0, \quad and \quad \pi_U^{*1} = (1-\lambda_1)\Pi_1^m.$$

In Stage 1, U and D_1 choose among three options:

Option 1: They fail their negotiation, in which case the payoffs are:

$$\pi_1 = 0, \quad \pi_U^{*2} = (1-\lambda_2)\Pi_2^m.$$

Option 2: They negotiate a contract, in which case they have two options:

(a) If they set S_1 such that Condition 1 does not hold, the second negotiation breaks down and their payoffs are

$$\pi_1^* = \lambda_1 \Pi_1^m, \quad \pi_U^{*1} = (1-\lambda_1)\Pi_1^m.$$

(b) If they set S_1 satisfying Condition 1, the second negotiation succeeds and their payoffs are eventually given by:

$$\pi_1^{**}(S_1) = -S_1, \quad \pi_U^{**}(S_1) = (1-\lambda_2)\left[\Pi^M + S_1 - (1-\lambda_1)\Pi_1^m\right] + (1-\lambda_1)\Pi_1^m.$$

Observe that, in *Option 2b*, if U and D_1 set $S_1 = (1-\lambda_1)\Pi_1^m - \Pi^M$, U gets the same payoff as in *Option 2a* and D_1 gets $\Pi^M - \pi_U$ instead of $\Pi_1^m - \pi_U$. In other words, in *Option 2b*, U and D_1 can set an up-front payment which enables them to do better than in *Option 2a*. Therefore, they prefer *Option 2b* to *Option 2a*. Similarly, they prefer *Option 2b* to *Option 1* since setting $S_1 = 0$ in *Option 2b* gives D_1 zero payoff as in *Option 1* and gives U the payoff of $(1-\lambda_2)\Pi^M + \lambda_2(1-\lambda_1)\Pi_1^m$, which is superior to its payoff in *Option 1*. Hence, U and D_1 prefer *Option 2b* and set $S_1 \geq (1-\lambda_1)\Pi_1^m - \Pi^M$. At optimum, S_1 is chosen by

$$\max_{S_1} \left\{(1-\lambda_2)\left[\Pi^M + S_1 - (1-\lambda_1)\Pi_1^m\right] + (1-\lambda_1)\Pi_1^m - (1-\lambda_2)\Pi_2^m\right\}^{(1-\lambda_1)} \{-S_1\}^{\lambda_1} \tag{.3}$$

$$s.t. S_1 \geq (1-\lambda_1)\Pi_1^m - \Pi^M$$

The constraint requires that the gains from trade between U and D_2 are non-negative (that is, Condition 1 is satisfied) so that the negotiation with D_2 does not fail once T_1 is signed.

If the constraint is not binding, the first-order condition characterizes the equilibrium up-front fee:

$$S_1^{**} = -\lambda_1 \left[\Pi^M - \Pi_2^m + \frac{\lambda_2(1-\lambda_1)}{1-\lambda_2}\Pi_1^m\right], \tag{.4}$$

which satisfies the constraint if (and only if) $(P1)$ holds. In this case, from (.2), S_2^{**} is equal to

$$S_2^{**} = -\lambda_2 \left[(1-\lambda_1)\Pi^M + \lambda_1\Pi_2^m - \frac{(1-\lambda_1)(1-\lambda_2+\lambda_1\lambda_2)}{1-\lambda_2}\Pi_1^m\right].$$

Replacing S_1^{**} and S_2^{**} into the profit equations (.1) gives us the equilibrium payoffs of this case. U gets at least its disagreement payoff with D_2, $(1-\lambda_1)\Pi_1^m$, and at least its disagreement payoff with D_1, $(1-\lambda_2)\Pi_2^m$, by the definition of the Generalized Nash Bargaining solution. If $(P1)$ does not hold, the constraint must be binding, that is, $S_1^{**} = (1-\lambda_1)\Pi_1^m - \Pi^M$, which leads to $S_2^{**} = 0$ and

$$\pi_1^{**} = \Pi^M - (1-\lambda_1)\Pi_1^m; \pi_2^{**} = 0; \pi_U^{**} = (1-\lambda_1)\Pi_1^m.$$

U gets exactly its disagreement payoff with D_2. By Lemma (1), we have $(1-\lambda_1)\Pi_1^m \geq (1-\lambda_2)\Pi_2^m$, so U also gets at least its disagreement payoff with D_1. Hence, U has no incentive to fail its negotiation with D_1, and once T_1^{**} is signed, it has no incentive to fail its negotiation with D_2, either. Similarly, as both retailers get non-negative payoffs under contracts (T_1^{**}, T_2^{**}), none of them has an incentive to fail its negotiation with U.

Proof of Proposition 4. Consider the equilibrium of the game without renegotiation where both retailers are active. Equation (15) gives the bilateral profit of U and D_1 in this case. Observe that the bilateral profit is bounded above:

$$(\pi_1^{**} + \pi_U^{**})^{NR} < (1-\lambda_2)\Pi^M + \lambda_2\Pi_1^m, \tag{.5}$$

since $\Pi(q_1^{**}, q_2^{**}) < \Pi^M$ and $\partial_{q_2} R_1(q_1^{**}, q_2^{**}) < 0$. Consider the case of the game with renegotiation when (P1) holds. Equation (16) gives the bilateral profit of U and D_1 in this case. Comparing (16) with (15) and using (.5), I derive a sufficient condition under which U and D_1 prefer the contracting with renegotiation from scratch to without renegotiation:

$$\lambda_2 \geq \frac{1}{1 + \frac{(1-\lambda_1)\Pi_1^m}{\Pi_1^m + \Pi_2^m - \Pi^M}} \equiv \overline{\lambda_2}. \tag{.6}$$

Proof of Proposition 7. Suppose that $(1-\lambda_2)\Pi_2^m > (1-\lambda_1)\Pi_1^m$. If U negotiates first with D_1, by Lemma 1, $(P1)$ holds and U gets

$$\pi_U^{**} = (1-\lambda_2)\left[(1-\lambda_1)\Pi^M + \lambda_1\Pi_2^m - \frac{(1-\lambda_1)(1-\lambda_2+\lambda_1\lambda_2)}{1-\lambda_2}\Pi_1^m\right] + (1-\lambda_1)\Pi_1^m.$$

If U negotiates first with D_2, when $(P2)$ holds, U gets

$$\pi_U^{**} = (1-\lambda_1)\left[(1-\lambda_2)\Pi^M + \lambda_2\Pi_1^m - \frac{(1-\lambda_2)(1-\lambda_1+\lambda_1\lambda_2)}{1-\lambda_1}\Pi_2^m\right] + (1-\lambda_2)\Pi_2^m.$$

U strictly prefers *(i)* to *(ii)* since $(1-\lambda_2)\Pi_2^m > (1-\lambda_1)\Pi_1^m$.

When $(P2)$ does not hold, U gets $\pi_U^{**} = (1-\lambda_2)\Pi_2^m$. U strictly prefers *(i)* to *(ii)* if $\Pi^M > \Pi_2^m - \dfrac{\lambda_2(1-\lambda_1)\Pi_1^m}{1-\lambda_2}$ which is always the case as $\Pi^M > \Pi_2^m$ and $\lambda_i \in [0,1]$.

Symmetrically, if $(1-\lambda_2)\Pi_2^m \leq (1-\lambda_1)\Pi_1^m$, U prefers *(ii)* to *(i)*.

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Highlights

- This paper analyzes the strategic use of bilateral supply contracts in sequential negotiations between one manufacturer and two differentiated retailers.
- Allowing for general supply contracts, which are functions of own quantity, but cannot be contingent on the rival's quantity, with full commitment, I show that the first contract's quantity is distorted away from the fully-integrated monopoly outcome.
- This distortion is explained by the firstly negotiating parties' incentives to extract more rent from the second retailer.
- To prevent such distortion, the first contracting pair may prefer to sign a contract which has no commitment power should the manufacturer fail in its subsequent negotiation.
- A simple renegotiation clause in bilateral contracts would enable the firms to implement the monopoly outcome and the first contracting parties to capture more rent.