Buyer-Induced Exclusive Dealing

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(Preliminary Draft: February 21, 2014)

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1 The author thanks the Bankard Fund for Political Economy for providing financial support for this research.
I. Introduction

Exclusive dealing arrangements require a buyer to purchase a good exclusively or chiefly from a single supplier. The buyer may be a retailer or distributor who resells the good, or may be an end user. In most instances these arrangements - whether a requirement or an agreement - are imposed on the buyer by the seller. The seller may seek an exclusive dealing arrangement for several procompetitive reasons such as preventing competing suppliers from free riding on the seller’s investments in a distributor’s sales effectiveness (Marvel, 1982). But an exclusive dealing arrangement may have an adverse effect on competition if it forecloses the supplier’s competitors from a sufficiently large portion of the market for a sufficient period of time. Exclusive dealing may exclude even an entrant who is more efficient than the incumbent seller who imposes exclusive dealing on its buyers. When there are economies of scale in production and many buyers have exclusive deals with the incumbent, an entrant cannot garner enough business to reach the minimum efficient scale of operations.²

Although the extensive literature on exclusive dealing concerns mainly those arrangements imposed by sellers, some exclusive dealing arrangements are instigated by buyers rather than sellers. These arrangements arise in markets for homogeneous goods where sellers only compete in prices, but they also arise in markets for differentiated products and branded consumer goods. For instance, a chain of convenience stores may sell a single brand of light bulbs or sun glasses, or a chain of fast-food restaurants may sell a single company’s fountain

² There is a substantial literature on the uses of exclusive dealing to deter entry, beginning with Aghion and Bolton (1987) and followed by Rasmusen, Ramseyer and Wiley (1991), Bernheim and Whinston (1998) and Segal and Whinston (2000) among others. This literature was precipitated by, and ultimately qualified, Bork’s (1978) claim that an exclusive dealing agreement can only increase rather than decrease consumer benefits because retail competition compels the retailer to act as an agent for consumers. Bork reasoned that the manufacturer would have to compensate the retailer for any loss in consumer benefits created by exclusive dealing, and that this requirement would make anticompetitive exclusive dealing unprofitable for the manufacturer. With this line of reasoning, the only exclusive dealing agreements that would be consummated are those that increase consumer welfare.
beverages. In the health sector, insurers and health maintenance organizations may impose tight restrictions on patients’ choice of drugs and care providers.

The UK Competition Commission conducted a survey of nearly 500 suppliers to grocery retailers in the UK in 2006. This survey revealed that 35 percent of suppliers had been asked to enter into an exclusivity agreement by a customer, and “[o]verall 19 percent of all suppliers actually entered into an exclusivity agreement” (2006, p. 39). Large customers were the most active solicitors of exclusivity agreements. Of those suppliers receiving these requests, two-thirds were made by one of the four largest supermarket chains in the UK. These responses include both exclusive dealing and exclusive distribution agreements.3

Buyer-induced exclusive dealing arrangements have different motivations and effects than seller-imposed deals. In many distribution channels, there is more market power at the distribution stage than upstream at the manufacturing stage because “consumers are more disposed to switch brands within store than switch stores within brand” (Steiner, 1985). Large retailers or distributors may exercise buyer power to obtain preferential terms of sale from suppliers that are not available to small buyers. Dobson (2008) observed that “buyer-led restraints . . . occur most commonly . . . [when] the buyer holds some bargaining advantage over suppliers that ensures their compliance or consent” (p. 1931).

One tactic for such a buyer is to use the prospect of exclusivity to play one supplier off against another to reduce purchase prices as Galbraith (1952) once argued. Steuer (2000) wrote that a large customer with buying power “may announce to would-be suppliers that it will commit to buy from only one of them and that if they hope to be selected they had better offer their products on the most attractive terms . . . . It is an all-or-nothing game, with each supplier

3 An exclusive dealing arrangement occurs when the supplier is the retailer’s exclusive source for some line of goods. An exclusive distributor arrangement occurs when the retailer is the supplier’s exclusive customer.
knowing that it must offer the best terms to obtain any of that customer’s business” (p.239-240). Similarly, Abbott and Wright (forthcoming) note that large buyers may use exclusive dealing “to intensify competition by manufacturers for their business and to improve purchase terms” (p. 28).

The U. K. Competition Commission’s survey of suppliers in the UK grocery market provides some evidence that large retailers pit suppliers against each other in contests to win distribution. The Commission reported that 30 percent of the suppliers indicated that they had “tendered for business via auctions” (2006, p. 65). Of those suppliers who claimed they have bid for business via auction, 72 percent indicated that the auction was with one of the four largest supermarket chains. This survey also indicates that 79 percent of the suppliers who bid for business via auction earned lower gross margins on these sales than on other sales.

When a distributor or retailer commits to a single supplier of a branded consumer good, exclusive dealing reduces consumers’ choices. Faced with limited brand selection, those consumers who do not find their preferred brand in stock at a retailer must either switch brands or switch stores. Having driven its acquisition costs down by playing one supplier off against another, the retailer may reduce retail prices to discourage store switching and encourage brand switching (Klein and Murphy, 2008). Whether consumer welfare decreases because brand selection is limited or increases because retail prices are lower is unclear a priori. That is the question examined in this paper.

Both Klein and Murphy and Gabrielsen and Sørgard (1999) investigate buyer-induced exclusive dealing. Both show that under certain conditions, exclusive distribution contracts between retailers and suppliers can reduce retail prices of the exclusive brand enough to increase consumer welfare even though some consumers do not purchase their preferred brand. This
possibility is consistent with Galbraith’s (1952) early argument that price concessions won by large buyers upstream translate into lower prices for consumers downstream.

These issues are related to those addressed in two clusters of papers in the literature on exclusive dealing arrangements. The first cluster includes contributions by Mathewson and Winter (1987), O’Brien and Shaffer (1997) and Bernheim and Whinston (1998). These papers explore interactions in vertical structures similar to the one explored here (i.e., two manufacturers and a single retailer), but where the initiative in vertical contracting is assigned to the upstream suppliers rather than to the downstream buyer. Mathewson and Winter’s suppliers compete in linear tariffs coupled with the option to offer the retailer an exclusive dealing requirement. They find that exclusive dealing may arise in equilibrium, and that total welfare may increase as a result. O’Brien and Shaffer, and Bernheim and Whinston do not restrict suppliers to linear tariffs and find that where nonlinear tariffs are feasible, exclusive dealing does not arise in equilibrium. This paper asks similar questions, but the initiative in vertical contracting is assigned to the buyer rather than the suppliers. This is in keeping with the paper’s focus on the presumed buyer power of large buyers.

Papers such as Mathewson and Winter (1997), Marvel and Yang (2008), Dana (2012) and Chen and Li (2013) are in a second cluster of related papers. These examine the welfare effects of exclusive supply arrangements orchestrated by buying groups. Independent buyers of intermediate products form buying groups and consolidate orders to exercise buyer power when purchasing from sellers of competing brands. Hospital buying groups, for instance, are formed to negotiate the purchase of hospital supplies and equipment for its members. Diverse state and municipal agencies often pool their purchasing in the same way. These buying groups exist mainly because they are able to leverage their sales volume to wrest advantageous terms from
suppliers. These organizations differ from large retailers or distributors with buyer power in that they are comprised of end users of the goods purchased. This paper examines vertical structures in which retailers or distributors with buyer power resell rather than consume the goods in question.

Section II models the interactions between a retailer with market power and two suppliers of differentiated goods as a bargaining game where the retailer negotiates with both suppliers simultaneously. The outcome of this game, given by the Nash bargaining solution, has the retailer distributing the brands sold by both suppliers and maximizes the firms’ joint surplus. This outcome is taken as the benchmark for comparison with the outcome produced when the retailer plays one supplier off against the other in pursuit of an exclusive deal. Section III models interactions between the retailer and the suppliers as a three-stage non-cooperative game in which the retailer has the option to commit to choosing a single supplier before it solicits terms of sale from the suppliers. The analysis produces a generalized necessary and sufficient condition for predicting when the retailer opts for inducing an exclusive dealing arrangement.

In section IV, a specific demand structure is introduced to examine more thoroughly the implications of this necessary and sufficient condition. This demand structure incorporates elements of both vertical and horizontal product differentiation. The analysis shows that the retailer opts for an exclusive supply arrangement when consumers’ preferences for the brands they favor are not too strong. Consumers are not necessarily injured if the retailer pursues an exclusive supply arrangement. Depending on parameter values, the retailer’s preference for exclusive dealing may increase or reduce consumer welfare. Also, some parameter values show the retailer preferring to distribute both brands when consumer welfare would be greater with
buyer-induced exclusive dealing. In short, the interests of consumers may or may not line up with those of a retailer who induces exclusive dealing.

II. Bargaining without Exclusivity

The vertical structure consists of a single retailer or distributor and two manufacturers that produce differentiated brands of the same good. The manufacturers have no fixed costs and have constant marginal costs which, for analytical ease, we assume are zero. The retailer has market power when reselling the good to consumers. This market power may be due to the firm’s size, location, or other distinguishing characteristics. Or in the case of grocery stores, mass merchandisers and the like, some degree of market power is due to consumers’ shopping for several items simultaneously instead of single items. Shopping for several items simultaneously conserves shopping costs, but it reduces consumers’ in-store demand elasticities for specific goods. In addition, large retailers have significant populations of loyal customers who incur switching costs if they shop elsewhere.

The retailer’s operating costs are fixed and sunk. The marginal cost of handling and reselling a unit of either manufacturer’s good is constant and zero. Consumers’ inverse demands \( f_i(q_i, q_j) \) for the two goods at the retailer’s establishment have \( \frac{\partial f_i}{\partial q_i} < 0, \frac{\partial^2 f}{\partial q_i \partial q_j} < 0 \) and \( \frac{\partial^2 f}{\partial q_i \partial q_j} \leq 0 \) for \( i, j = 1, 2 \).

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4 Size is essential. Inderst and Shaffer (2008, p. 1630) write that “[t]he main source of buyer power . . . is the ability to substitute away from any given supplier’s input. . . . [I]n general the profitability and thus the credibility of substitution should increase with the buyer’s relative size.”

5 Bliss (1988, p. 38) identifies this “captive buyer” effect as a contributing factor to retailers’ market power in the sale of specific goods.

6 Dobson (2005) attributes some of the buyer power acquired by large retailers that distribute many products to the asymmetry between the large number of products and suppliers these firms have and the small number of products and customers served by the suppliers.
Events in the vertical structure take place in two stages. At the first stage the retailer negotiates simultaneously and separately with each manufacturer. These negotiations determine the quantity $q_i \geq 0$ of each good the retailer acquires and the payment $T_i \geq 0$ each manufacturer receives from the retailer. This representation allows the firms to negotiate nonlinear pricing schedules. At the second stage the retailer sets the retail price $p_i = f_i(q_i, q_2) \geq 0, i = 1, 2$ of each good. The retailer cannot price discriminate among consumers.

The outcome of the firms’ negotiations is given by the Nash bargaining solution. Following Chipty and Snyder’s (1999) formulation of Nash bargaining when a single agent (in this case, a buyer) bargains simultaneously with two or more agents (in this case, suppliers), the firms exchange those quantities of each good that maximize their joint surplus. The firms divide that surplus according to the rule: the retailer and each manufacturer equally divide the incremental surplus created by their agreement on the assumption that the retailer and the other manufacturer exchange the surplus-maximizing quantity.\(^7\) Although it is unnecessary to go into details, the Nash bargaining solution is formally implemented by a dynamic, noncooperative bargaining game, as Rubinstein (1982) demonstrated.

Let $V(q_1, q_2) = \sum_{i=1,2} q_i f_i(q_i, q_2)$ be the firms’ strictly concave joint surplus function, and let $(q_1^*, q_2^*)$ be the unique quantities that maximize this surplus:

$$q_i^* = \arg \max_x [V(x, q_2^*)] \text{ and } q_2^* = \arg \max_x [V(q_1^*, x)]$$ \hspace{1cm} (1)

\(^7\) In addition to Chipty and Snyder (1999), similar formulations of simultaneous bilateral bargaining have been used by Horn and Wolinsky (1988), Stole and Zwiebel (1996) and Inderst and Mazzarotto (2008). The interactions between a retailer and its manufacturers have been modeled in various ways. When there is a single party on one side and more than one party on the other side, Whinston (2006) distinguishes multi-stage, noncooperative games where the single party makes a take or leave offer to other parties in the first stage from games where the other parties submit bids in the first stage. O’Brien and Shaffer (1997) model these interactions by allowing one party to make a take or leave offer of a menu of contracts from which the other parties choose.
These are the equilibrium quantities exchanged in the Nash bargaining solution. The distribution of $V(q_i^*, q_j^*)$ among the firms in this equilibrium depends on the firms’ incremental payoffs. To calculate these payoffs, assume that the retailer and manufacturer $i$ believe that negotiations between the retailer and manufacturer $j$ lead to the efficient quantity $q_j^*$. These beliefs mean that the firms anticipate that manufacturer $j$ and the retailer will exchange $q_j^*$ units even if their own negotiations break down so that $q_i = 0$. With this, the incremental payoff shared by the retailer and manufacturer $i$ is $V(q_i^*, q_j^*) - V(0, q_j^*)$ because $q_i = 0$ if negotiations break down between that manufacturer and the retailer. Similarly, the incremental payoff shared by the retailer and manufacturer 2 is $V(q_i^*, q_j^*) - V(q_i^*, 0)$.

The equilibrium payments $(T_1^*, T_2^*)$ are calculated to distribute the incremental payoff of each transaction equally between the parties to the transactions:

$$T_i^* = \frac{V(q_i^*, q_j^*) - V(0, q_j^*)}{2} \quad \text{and} \quad T^*_2 = \frac{V(q_i^*, q_j^*) - V(q_i^*, 0)}{2}$$

(2)

These payments are the manufacturers’ profits:

$$\pi_i^* = T_i^* \quad \text{and} \quad \pi_2^* = T_2^*$$

(3)

The retailer’s prices are $p_i^* = f_i(q_i^*, q_j^*)$ and $p_j^* = f_j(q_i^*, q_j^*)$, and its profit is:

$$\pi^*_R = V(q_i^*, q_j^*) - T_i^* - T_2^* = \frac{V(q_i^*, 0) + V(0, q_j^*)}{2}$$

(4)

The values in equations (1) – (4) represent the outcome if the firms strike an efficient bargain without a provision for an exclusive supplier. They provide a benchmark for comparison with the outcome, considered next, that accompanies an exclusive supplier arrangement.

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8 McAfee and Schwartz (1994) call these “passive beliefs.”
III. Choosing an Exclusive Supplier

Even though simultaneous bilateral bargaining in this vertical structure allows the firms to maximize their joint surplus, the retailer’s profit may be greater if the firm forgoes negotiating with both manufacturers and instead pursues an exclusive supply contract with one of the manufacturers. The retailer’s market power means that some consumers could be prompted to “switch brands” rather than “switch stores” if the retailer does not offer their preferred brand. By soliciting bids from the manufacturers for an exclusive supply contract, the retailer can exploit what Galbraith called “the opportunity of a strong buyer to play one seller off against the other” (1952, p. 123). In effect, the retailer can refuse to contract with both manufacturers and instead award an exclusive supply contract to the manufacturer who offers the retailer the best deal.

With this, events in the vertical structure take place in three stages. At the first stage the retailer solicits $(q_i, T_i)$ bids from each manufacturer. The manufacturers submit bids in the second stage that specify both $q_i$ and $T_i$. At the third stage the retailer contracts with one of the manufacturers and sets the relevant retail price. This game has a perfect equilibrium in which one of the manufacturers wins the contract to supply the retailer.

The firms’ equilibrium strategies are found using backward recursion. Suppose that the retailer commits to purchasing from a single manufacturer at the first stage, and that the manufacturers submit bids $(q_i, T_i)$ at the second stage. Then at the third stage, the retailer accepts manufacturer $i$’s offer if $[V(q_i, 0) - T_i] > [V(0, q_i) - T_i]$ and sets $p_i = f_i(q_i, 0)$. With this

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9 It is not unusual for large buyers and their suppliers to have long-term, fixed-quantity contracts. Noll (2005, p. 603), for instance, observes that large buyers often do not exercise their dominance by “posting a low buying price and waiting for sellers to arrive. Instead the common practice is for buyers and sellers to negotiate a long-term contract that specifies both price and quantity.”
outcome, the retailer’s profit is $V(q,0) - T_i$ and manufacturer $i$’s profit is $T_i$. If 
$[V(q,0) - T_i] < [V(0,q) - T_j]$, the retailer accepts manufacturer 2’s offer and sets $p_2 = f_2(0,q)$. Here the retailer’s profit is $V(0,q) - T_2$ and manufacturer 2’s profit is $T_2$. If 
$[V(q,0) - T_i] = [V(0,q) - T_j]$, the retailer chooses a supplier at random.

Now consider the second stage, again assuming that the retailer commits to purchasing from a single manufacturer at the first stage. At the second stage, if manufacturer $i$ offers any $(q_i, T_i)$ which is less profitable for the retailer than some $(q_j, T_j)$ where $T_j \geq 0$, manufacturer $j$ would respond by making an offer that is more profitable for the retailer than $(q_i, T_i)$. Of course, neither manufacturer would make an offer $(q_i, T_i)$ where $T_i < 0$.

Let $(\hat{q}_i, \hat{q}_2)$ be the unique quantities:

$$\hat{q}_i = \arg\max_x [V(x,0)] \text{ and } \hat{q}_2 = \arg\max_x [V(0,x)]$$ (5)

These “stand alone” quantities maximize the joint surplus of the retailer and one manufacturer when the retailer does not contract with the other manufacturer. With no loss of generality, assume that good $i$ is the more “popular” brand in the sense that it offers the greater stand alone surplus: $V(\hat{q}_i,0) \geq V(0,\hat{q}_2)$. Because manufacturer 2 will not offer the retailer any $(\hat{q}_2, T_2)$ where $T_2 < 0$, manufacturer $i$ can profitably undercut any offer that manufacturer 2 makes.

In equilibrium, manufacturer $i$ offers, and the retailer accepts, the bid $(\hat{q}_i, \hat{T}_i)$ where:

$$\hat{T}_i = V(\hat{q}_i,0) - V(0,\hat{q}_2)$$ (6)

The retailer charges consumers the price $\hat{p}_i = f_i(\hat{q}_i,0)$ and earns

$$\hat{\pi}_R = V(0,\hat{q}_2)$$ (7)

11
in profit. That is, the retailer contracts with the manufacturer that can provide the greater stand-alone surplus, but only retains profit equal to the stand-alone surplus that the excluded manufacturer might have provided. Manufacturer \( i \)'s profit is

\[
\hat{\pi}_i = \hat{T}_i
\]

and manufacturer 2 has no sales and earns no profit. This equilibrium is the outcome of Bertrand-like competition between manufacturers for an exclusive supply contract with the retailer.

In asymmetric vertical structures like the one in this model, it is plausible (and in fact generally assumed) that the single party can initiate the form of negotiations with the vertical level that has two or more parties. The retailer has the option to bargain simultaneously with both manufacturers for non-exclusive terms, or to commit itself to a single source of supply and solicit an exclusive dealing arrangement with one of the manufacturers. Whether the retailer opts for exclusive dealing depends on the firm’s comparative profit in the two equilibria.

Comparing \( \pi^*_R \) and \( \hat{\pi}_R \) in equations (4) and (7) gives:

**Proposition 1:** The retailer opts for an exclusive supplier iff

\[
V(0, \hat{q}_2) \geq \frac{V(q_i^*, 0) + V(0, q_2^*)}{2}
\]

This necessary and sufficient condition for the retailer to seek an exclusive dealing arrangement is that the stand-alone surplus with the excluded good is no less than the average of the surpluses defined by the firms’ disagreement points if the retailer bargains without an exclusivity provision.

Each of the stand-alone quantities is greater than the corresponding quantity when the joint surplus of all three firms is maximized (See the Appendix for a Proof):
**Proposition 2:** \( \hat{q}_i > q^*_i \) for \( i = 1,2 \)

This Proposition indicates that when the retailer opts for an exclusive supplier, the retailer’s unit sales of that supplier’s brand is greater than where both brands are distributed: \( \hat{q}_i > q^*_i \). Apart from this result, it is not possible to compare outcomes in the two equilibria without further restricting the demand functions \( f_i(q_i, q_j), i = 1,2 \). In principle, the price of the exclusive good \( \hat{p}_i \) may be greater or less than the price of the same good \( p^*_i \) if the retailer negotiates contracts with both manufacturers.

In order to analyze more thoroughly the retailer’s option to choose an exclusive supplier, and to explore welfare implications of this business strategy, it is necessary to depict consumers’ demand for the goods more completely. The next section considers a demand specification that extends the analysis.

**IV. A Useful Demand Specification**

There are two types of consumers. Type 1 consumers prefer brand 1 over brand 2, and conversely for type 2 consumers. The retailer has a continuum \([0, 1]\) of consumers where \( a \in (1/2, 1) \) are type 1 and the remaining \( 1-a \) are type 2. This is in keeping with the previous assumption that brand 1 is more popular. Every consumer of either type has a taste parameter \( \theta \), where \( \theta \) is uniformly distributed on \([0, 1]\). Consumers purchase a single unit of one brand or else purchase nothing. The retailer cannot observe consumers’ taste parameters or types, and so cannot price discriminate among consumers.

A representative type 1 consumer's utility is \( \theta - p_2 \) if she buys a unit of brand 2 and is \( \beta \theta - p_1 \) if she buys a unit of brand 1, where \( \beta > 1 \). If she purchases neither good, the consumer’s
utility is 0. A representative type 2 consumer’s utility is $\theta - p_i$ if she buys a unit of brand $I$, 
$\beta \theta - p_2$ if she buys a unit of brand 2, and 0 if she buys neither good. These preferences allow
for both vertical and horizontal differentiation. Within types, all consumers prefer the same 
brand, albeit with different intensities. This is the vertical element. Across types, consumers’ 
rank the brands differently. This is the horizontal element.

IV. A. Distributing Both Brands

If the retailer elects to distribute both brands, the firm bargains simultaneously with each 
manufacturer and sells the quantities ($q_1^*, q_2^*$) defined by equation (1). To find these quantities,
we must derive the demands for both brands by consumers of each type. Let $q_j^i$ be the number of 
units of brand $j$ sold to type $i$ consumers so that $q_j = q_j^1 + q_j^2$.

Consider type 1 consumers first. Ordering consumers by descending values of $\theta$, type 1 
consumers’ inverse demand for brand $I$ is:

$$\phi_i^1 = \beta (1 - \frac{q}{a}),$$

(9)
neglecting the brand 2 option. Similarly, neglecting the brand 1 option, type 1 consumers’
inverse demand for brand 2 is:

$$\phi_i^2 = (1 - \frac{q}{a}).$$

(10)

Where both brands are available, type 1 consumers’ demands for the brands depend on both 
$p_1$ and $p_2$. Non-negative quantities of $q_1^i$ and $q_2^i$ require prices that satisfy:

$$p_2 \in [0, 1] \text{ and } p_1 \in [0, p_2 + \beta - 1].$$

(11)
For prices that satisfy (11), type 1 consumers’ demands are derived from two conditions based on equations (9) and (10):

\[ \beta (1 - \frac{q_1}{a}) - p_1 = (1 - \frac{q_1}{a}) - p_2 \]

(12)

\[ 1 - \frac{q_1}{a} + \frac{q_2}{a} - p_2 = 0. \]

(13)

These conditions are depicted in Figure 1. Condition (12) identifies the margin between those type 1 consumers who choose brand 1 and those who choose brand 2. A type 1 consumer is indifferent between purchasing a unit of brand 1 and brand 2 when the consumer’s surplus is the same with either purchase. Condition (13) identifies the margin between those type 1 consumers who choose brand 2 and those who purchase neither brand. A type 1 consumer is indifferent between purchasing a unit of brand 2 and purchasing neither brand when prices are such that brand 2 confers no surplus.

Combining equations (12) and (13) gives type 1 consumers’ inverse demands for each brand over \( q_1 \in [0, a] \) and \( q_2 \in [0, 1-a] \):

\[ f_1^* = \beta (1 - \frac{q_1}{a}) - \frac{q_2}{a} \quad \text{and} \quad f_2^* = 1 - \frac{q_1}{a} - \frac{q_2}{a} \]

(14)

With these demands for type 1 consumers, it follows that (See the Appendix for a Proof):

**Lemma 1**: The firms’ joint surplus from sales to type 1 consumers is maximized when \( q_1^* = \frac{a}{2} \) and \( q_2^* = 0 \); these quantities are sustained by prices \( p_1 = \frac{\beta}{2} \) and \( p_2 \in [\frac{1}{2}, 1] \).

Capturing as much surplus as possible from sales to type 1 consumers involves selling at prices that produce no sales of brand 2.
Now consider sales to type 2 consumers. Using the same reasoning as before with type 1 consumers, we can derive type 2 consumers’ demands to get the analogous result (the proof is analogous to the proof of Lemma 1):

**Lemma 2**: The firms’ joint surplus from sales to type 2 consumers is maximized when \( q_1^2 = 0 \) and \( q_2^2 = \frac{1-a}{2} \); these quantities are sustained by prices \( p_1 \in \left[ \frac{1}{2}, 1 \right] \) and \( p_2 = \frac{\beta}{2} \).

Taken together, Lemmas 1 and 2 indicate that maximizing the firms’ joint surplus from sales to all consumers involves no consumer purchasing a unit of their less preferred brand:

**Proposition 3**: The firms’ joint surplus from sales to all consumers is maximized at \( q_1^* = \frac{a}{2} \) and \( q_2^* = \frac{1-a}{2} \); these quantities are sustained by prices \( p_1^* = p_2^* = \frac{\beta}{2} \).

The values in Proposition 3 are the equilibrium prices and quantities under simultaneous bilateral bargaining between the retailer and the manufacturers.

When the quantities in Proposition 3 are produced the firms’ joint surplus is

\[
V( q_1^*, q_2^* ) = \frac{\beta}{4} .
\]

To find how this surplus is distributed among the firms in equilibrium, we must use the disagreement payoffs:

\[
V( q_1^*, 0 ) = p_1^* q_1^* = \frac{a \beta}{4} \quad \text{(15)}
\]

\[
V( 0, q_2^* ) = p_2^* q_2^* = \frac{(1-a) \beta}{4}
\]

These values indicate that the incremental surplus attributable to the transaction between the retailer and manufacturer 1 is:
\[ V(q_1^*, q_2^*) - V(0, q_2^*) = \frac{a\beta}{4}. \] (16)

Similarly, the incremental surplus attributable to the transaction between the retailer and manufacturer 2 is

\[ V(q_1^*, q_2^*) - V(q_1^*, 0) = \frac{(1-a)\beta}{4}. \] (17)

The retailer’s payments to the manufacturers \((T_i^*, T_2^*)\) are calculated to distribute the incremental surplus of each transaction equally between the retailer and the relevant manufacturer:

\[
\begin{align*}
T_i^* &= \frac{V(q_1^*, q_2^*) - V(0, q_2^*)}{2} = \frac{a\beta}{8} \\
T_2^* &= \frac{V(q_1^*, q_2^*) - V(q_1^*, 0)}{2} = \frac{(1-a)\beta}{8}
\end{align*}
\] (18)

The retailer retains the residual surplus \(V(q_1^*, q_2^*) - T_i^* - T_2^*\). In sum, the firms’ profits in the equilibrium with simultaneous bilateral bargaining are:

\[
\pi_i^* = \frac{a\beta}{8}, \quad \pi_2^* = \frac{(1-a)\beta}{8} \text{ and } \pi_R^* = \frac{\beta}{8}
\] (19)

**IV. B. Distributing a Single Brand**

Now suppose the retailer elects at the outset to contract with an exclusive supplier instead of distributing both brands. To determine whether the retailer’s profit would be greater than \(\pi_R^*\) if the firm opts for an exclusive supply arrangement, we must compare \(\pi_R^*\) in equation (19) to \(\hat{\pi}_R\) as defined in equation (4). To calculate \(\hat{\pi}_R\), recall that the retailer contracts with the manufacturer that can provide the greater stand alone surplus, but only retains profit equal to the stand alone surplus that the excluded manufacturer might have provided. The retailer contracts with
manufacturer 1 if $V(\hat{q}_1,0) \geq V(0,\hat{q}_2)$; otherwise the firm contracts with manufacturer 2. The retailer’s profit $\hat{\pi}_g$ is the lesser of $V(\hat{q}_1,0)$ and $V(0,\hat{q}_2)$.

The quantities $\hat{q}_1$ and $\hat{q}_2$ are defined by equation (5). If the retailer sells only brand 1, then the inverse demands for that brand on the part of type 1 and type 2 consumers are:

$$f^1_i = \beta(1 - \frac{q^1_i}{a}) \quad \text{and} \quad f^2_i = 1 - \frac{q^2_i}{1 - a}. \quad (20)$$

To get the total inverse demand for brand 1 when brand 2 is not offered, we invert the functions (20), add them together to get the total demand for the brand, and then invert back:

$$f_i = \frac{\beta(1 - q_i)}{a + \beta - a\beta} \quad (21)$$

Using (21), the value of $q_i$ that maximizes $V(q_i,0)$ and the maximized value of $V(q_i,0)$ are:

$$\hat{q}_i = \frac{1}{2} \quad \text{and} \quad V(\hat{q}_i,0) = \frac{\beta}{4(a + \beta - a\beta)} \quad (22)$$

A similar derivation for brand 2 when brand 1 is not offered yields:

$$\hat{q}_2 = \frac{1}{2} \quad \text{and} \quad V(0,\hat{q}_2) = \frac{\beta}{4(1 - a + a\beta)} \quad (23)$$

With $a > \frac{1}{2}$ and $\beta > 1$, equations (22) and (23) indicate that $V(\hat{q}_1,0) > V(0,\hat{q}_2)$. This means that if the retailer seeks an exclusive supply arrangement, manufacturer 1 will be the exclusive supplier (See the Appendix for a Proof):
Proposition 4: If the retailer opts for an exclusive supplier, the firm buys $\hat{q}_1 = \frac{1}{2}$ units from manufacturer 1 for $\hat{T}_1 = \frac{B(2a-1)(\beta-1)}{4(a + \beta - a\beta)(1 - a + a\beta)}$. The retailer charges consumers $\hat{p}_1 = \frac{\beta}{2(a + \beta - a\beta)}$.

If the retailer opts for an exclusive supplier, manufacturer 2’s brand is excluded from the retailer’s distribution. Using equations (7) and (8), the firms’ profits are:

$$\hat{\pi}_1 = \hat{T}_1, \; \hat{\pi}_2 = 0 \text{ and } \hat{\pi}_R = \frac{\beta}{4(1 - a + a\beta)} \quad (24)$$

Comparing Propositions 3 and 4 confirms that $\hat{q}_1 > q_1^*$, as indicated by Proposition 2.

The propositions also show that $\hat{q}_1 = q_1^* + q_2^*$. The retailer sells more units of the more popular brand with an exclusivity arrangement, but the firm’s total unit sales are the same whether or not it chooses an exclusive supplier. The retail price of the selected brand is less than where the retailer distributes both brands: $\hat{p}_1 < p_1^*$. The price $p_1$ falls just enough for increased unit sales of the more popular brand to offset the displaced unit sales of the less popular brand.

IV. C. The Retailer’s Choice

The retailer will elect to pursue an exclusive supply arrangement if $\hat{\pi}_R \geq \pi_R^*$. Otherwise the firm will engage in simultaneous bilateral bargaining with the manufacturers. Comparing $\pi_R^*$ and $\hat{\pi}_R$ in equations (19) and (24) indicates whether the retailer opts for an exclusive dealing arrangement:

Proposition 5: The retailer opts for an exclusive supplier iff $\beta \leq \frac{1 + a}{a}$
To interpret Proposition 5, notice that the parameters $\beta$ and $a$ correspond, respectively, to the extent of vertical and horizontal product differentiation between the manufacturers’ brands. The parameter $\beta$ is a measure, within types, of the intensity of consumers’ preferences for the brands they favor. The greater is $\beta$, the greater is the premium consumers are willing to pay for their favored brand. This parameter reflects the extent of vertical product differentiation. The parameter $a$ reflects the size asymmetry of the two consumer groups. A smaller value of $a$ indicates that consumers’ preferences reflect greater horizontal product differentiation. But as $a \rightarrow 1$, horizontal product differentiation disappears altogether.

**Proposition 5** shows that if consumers’ brand preferences are weak ($\beta$ is small), the retailer opts for an exclusive supply arrangement. In lieu of distributing both brands, it is more profitable for the retailer to distribute only brand $I$ and charge $\hat{p}_I$ slightly below $p^*_I$ to induce some consumers to switch brands. If consumers’ brand preferences are strong enough, then the retailer exploits them by distributing both brands rather than selling only brand $I$ with $\hat{p}_I$ well below $p^*_I$. This result explains why a retailer’s distribution strategy may be different for different consumer good categories. For instance, a convenience store that sells only one brand of light bulbs may sell more than one brand of beer because consumers’ brand preferences are more pronounced for beer than light bulbs.

**Proposition 5** shows that the minimal strength of consumers’ brand preferences $\beta$ for the retailer to opt for distributing both brands depends on the parameter $a$. The threshold value of $\beta$ is lower where $a$ is large because one of the brands is substantially more popular than the other. When one brand is favored by a large majority of consumers, the retailer does not want to reduce the price of that brand enough to cause the minority to switch brands.
IV. D. Comparison with Previous Results

Klein and Murphy and also Gabrielsen and Sørgard explored issues similar to those in this paper. Some of the results in this paper are consistent with the findings these authors reported. The results in these earlier papers, like those here, pertain to specific stylized models of consumer demand and to interactions between two manufacturers and a single retailer. In this paper, the retailer uses the lure of an exclusive supply arrangement to play the manufacturers off against each other and win advantageous terms. Klein and Murphy also assume that, having committed to the selection of an exclusive supplier, the retailer plays the manufacturers off against each other. Gabrielsen and Sørgard do not allow this kind of “playing off.”

Both Klein and Murphy and by Gabrielsen and Sørgard begin with reduced-form aggregate demand functions and assume that in the absence of an exclusivity arrangement, manufacturers’ wholesale prices are determined by Bertrand interactions. However, these papers are dissimilar in regard to how retail prices are set. Gabrielsen and Sørgard assume that the retailer marks wholesale prices up in double-marginalization fashion for resale to consumers. Klein and Murphy assume that downstream competition compels the retailer to charge retail prices that merely cover costs. Gabrielsen and Sørgard’s characterization of retail pricing assumes that the firms cannot avoid squandering a significant share of the joint surplus latent in the vertical structure. Klein and Murphy’s assumption that retail prices are competitive rules out any exercise of downstream market power. In this paper, retail prices are determined differently depending on whether the retailer opts for an exclusive supplier. If the retailer distributes both

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10 Klein and Murphy’s (2008) analysis of buyer-induced exclusive dealing is not the focal point of their paper. The main thrust is that a retailer’s ability to shift incremental sales from one brand to another can reduce wholesale and retail prices.
brands, simultaneous bilateral bargaining drives retail prices to levels that maximize the firms’ joint surplus. If the retailer opts for exclusive dealing, the retailer exercises its downstream market power by setting retail prices unilaterally.

A comparison of Propositions 3 and 4 indicates that buyer-induced exclusive dealing reduces the retail price of the brand selected by the retailer. Both Klein and Murphy and Gabrielsen and Sørgard get a similar result.\textsuperscript{11} Although Klein and Murphy’s analysis provides no indication that a retailer would ever reject an opportunity to contract with an exclusive supplier, Gabrielsen and Sørgard model the retailer’s decision about whether to use exclusive dealing. They predict that the retailer is more likely to seek an exclusive supplier where one of the brands is preferred by a significant majority of consumers. Proposition 5 makes the opposite prediction because “playing off” is less remunerative for the retailer when few consumers prefer the second brand. Gabrielsen and Sørgard also predict that the retailer is more likely to seek an exclusive supplier where the brands are strongly differentiated. This prediction is counterintuitive. It means that the retailer denies consumers variety where consumers value variety most. Proposition 5 predicts that the retailer will not opt for an exclusive supplier where the brands are strongly differentiated (\(\beta\) is large).

IV. E. Welfare Effects

The retailer chooses unilaterally whether to pursue an exclusive supply arrangement, but the firm’s choice has pronounced redistributive effects for other market participants. The effect on the suppliers is the least surprising. If exclusive dealing is profitable for the retailer, then it reduces profits for both suppliers (See the Appendix for a Proof):

\textsuperscript{11} Mathewson and Winter (1987) find that seller-induced exclusive dealing reduces wholesale prices but may or may not reduce retail prices.
Proposition 6: \( \hat{\pi}_i < \pi_i^* \) for \( i = 1, 2 \) iff \( \beta \leq \frac{1+a}{a} \)

The reduction in profit is more extreme for manufacturer 2 than for manufacturer 1 because brand 2 is not distributed at all when the retailer contracts exclusively with manufacturer 1.

Consumers also are affected by the retailer’s decision about whether to pursue an exclusive supply arrangement. Consumer welfare may be greater or less when the retailer opts for an exclusive supplier (See the Appendix for a Proof):

Proposition 7: Consumer welfare is greater with an exclusive supplier iff
\[
\beta \geq \frac{4a}{4a - 1}
\]

This Proposition shows that if consumers’ brand preferences are sufficiently strong (i.e., \( \beta \) is large), an exclusive supply arrangement increases consumer welfare. This happens even though consumers who prefer the excluded brand lose that option. With exclusive dealing, the retailer cuts the price of the exclusive brand to induce some of these consumers to switch. The requisite strength \( \beta \) of consumers’ preferences for consumer welfare to increase with exclusive dealing is greater the smaller is the consumer group who prefer the excluded brand (i.e., \( a \) is large). Even where the strength of consumers’ preferences is not great, an exclusive dealing arrangement increases consumer welfare if one of the goods is favored by a large majority.

A comparison of Propositions 5 and 7 shows that the interests of the retailer and its consumers are sometimes, but not always, aligned. The parameter thresholds in these Propositions are depicted in Figure 2. Proposition 5 shows that the retailer chooses an exclusive supplier when parameter values fall below the upper threshold, but elects to distribute both brands when parameter values lie above this threshold. Similarly, Proposition 7 shows that
consumer welfare is greater if the retailer contracts with an exclusive supplier when parameter values are above the lower threshold, and conversely for values below this threshold.

The parameter values that fall in between the thresholds are those where the retailer takes on an exclusive supplier and consumers are the beneficiaries of this decision. Depending on the relative size of the two consumer groups, this alignment of the retailer’s and consumers’ interests occurs when consumers are willing to pay 33–100 percent more for their preferred brand than the alternative. With sufficiently high values of $\beta$, the retailer will not contract with an exclusive supplier even though consumers prefer that outcome. And with sufficiently low values of $\beta$, the retailer will contract with an exclusive supplier even though consumers prefer the two-brand outcome.

Even though consumer welfare may increase when the supplier opts for an exclusive supplier, total welfare does not. If exclusive dealing is profitable for the retailer, then it reduces total welfare (See the Appendix for a Proof):

**Proposition 8:** Total welfare is less with an exclusive supplier iff $\beta \leq \frac{1+a}{a}$

The welfare implications of Propositions 7 and 8 agree at some but not all points with those in the papers by Klein and Murphy and by Gabrielsen and Sørgard. Klein and Murphy’s model suggests that buyer-induced exclusive dealing always increases consumer welfare as well as total welfare.\(^{12}\) In Gabrielsen and Sørgard’s model, buyer-induced exclusive dealing may have a positive effect on total welfare but “will reduce welfare if the products are sufficiently differentiated” (1999, p. 135).

\(^{12}\) Zenger (2010) shows that this result depends on the assumption in Klein and Murphy’s model that the demand for the available brands is symmetric. If one of the brands is notably more popular, then exclusive dealing may reduce rather than increase total welfare.
V. Conclusion

The motivation and effects of exclusive dealing arrangements that are solicited by large retailers and distributors with market power are different than exclusivity arrangements orchestrated by manufacturers and suppliers with market power. When a retailer plays the suppliers of different brands of a consumer good off against each other by offering exclusive distribution to win advantageous wholesale pricing, there are mixed implications for consumers. The first implication of buyer-induced exclusive dealing is that consumers served by the retailer have fewer brand choices. The excluded brands are the least popular. At the same time, the analysis here indicates that exclusivity reduces the retail price of the brand that is selected for exclusive distribution. Retail prices for brands supplied exclusively are reduced to encourage those customers who prefer an excluded brand to switch brands rather than switch stores. Consumers who prefer the brand selected for exclusive distribution are better off, but those who prefer an excluded brand may or may not be better off. Total consumer welfare may increase or decrease as a result of this exclusivity.

The conditions that cause consumer welfare to increase when a retailer selects an exclusive supplier are different than, but overlap with, the conditions that cause the retailer to opt for an exclusive supplier. The retailer’s interest and the interest of consumers are in alignment unless consumers’ brand preferences are either “too weak” or “too strong.” If consumers have sufficiently weak brand preferences, the retailer distributes a single brand even though the price of the exclusive brand is not so low that consumers prefer that option to more brand variety. If consumers have sufficiently strong brand preferences, the retailer distributes both brands in order
to exploit those preferences with higher prices even though a consumer minority would prefer a second option even at a higher price.

The possibility that buyer-induced exclusive dealing reduces retail prices enough to increase consumer welfare even though some consumers do not purchase their preferred brand harkens back to Galbraith’s notion that the countervailing power of large retailers is beneficial to consumers. Galbraith’s claim does not apply to every large retailer or distributor with buyer power, but research on the downstream effects of countervailing power supports his claim in certain circumstances. Heretofore, all such circumstances have required the preservation of competition at the retail level even though the large retailer exercises countervailing power upstream.\(^{13}\) This paper identifies a different mechanism whereby countervailing power reduces retail prices and increases consumer welfare. A large retailer or distributor may reduce acquisition costs by playing suppliers off against each other and offering consumers a limited selection of brands. The firm reduces retail prices to encourage brand switching in lieu of store switching. If retail prices are reduced sufficiently, consumer welfare may increase.

The analysis in this paper has implications for vertical relationships in markets where firms bundle their own goods \(X\) with complementary products \(Y\). When complementary products are differentiated and are produced by two or more independent sellers, the producer of \(X\) may bundle \(X\) with the \(Y\) of a single supplier. This denies the firm’s customers the opportunity to choose a different brand of \(Y\) when they purchase \(X\). For instance, automobile manufacturers select the manufacturers of the tires and audio systems that are installed in new cars. Microsoft selects the software products that occupy the Windows desktop on new personal computers. A hospital may select the anesthesiology practice that its patients must use for surgical procedures,

\(^{13}\) For example, see von Ungen-Sternberg (1996), Dobson and Waterson (1997), Chen (2003) and Mills (2013).
and a house painter may select the brand of paint s(he) uses on a job. Where the producer of \( X \) chooses a brand of \( Y \) for its customers, rather than allowing the customers to choose, the firm may leverage its ability to choose to win advantageous terms of sale from \( Y \) producers. The welfare effects of this practice are similar to buyer-induced exclusive dealing in the distribution sector.

Exclusive dealing arrangements that are sought by suppliers with market power sometimes have anticompetitive exclusionary effects. It is unlikely that an exclusive dealing arrangement instigated by a retailer or distributor would be motivated by the goal of excluding suppliers or impeding the entry of new suppliers.\(^{14}\) But it is worth asking whether a dominant retailer or distributor’s buyer-induced exclusive dealing might nevertheless be exclusionary because it restricts the distribution of less popular brands or the brands introduced by new entrants. It is not likely that buyer-induced exclusive dealing has serious exclusionary effects. Even when the consumer population served by a large retailer has a \( (\beta, a) \) combination that makes exclusive dealing advantageous for that retailer, this does not prevent the brands excluded by that retailer from being distributed by other retailers who serve different customer populations. And of course, the retailer is not interested in driving the excluded supplier out of business because that would strengthen the strategic position of the retailer’s exclusive supplier.

At present, the consensus view of exclusive dealing arrangements is that they can be either anticompetitive or efficiency-promoting depending on several factors. This view is predicated mainly on the analysis of seller-induced exclusive dealing. This paper’s analysis of buyer-induced exclusive dealing only reinforces the consensus view.\(^{15}\) Exclusive dealing arrangements arise for different reasons in different commercial environments, and their effects

\(^{14}\) This kind of exclusion is the primary concern of the papers cited in footnote 2.

\(^{15}\) In his survey of a wide variety of buyer-led vertical restraints, Dobson (2008) reaches a similar conclusion.
on competition and welfare are not always the same. Submitting these practices to the rule of reason, rather than *per se* prohibition, remains the best antitrust response.
Figure 1

Figure 2
Appendix

Proposition 2: \( \hat{q}_i > q_i^* \) for \( i = 1, 2 \)

**Proof:** Recalling that \( V(q_1, q_2) = \sum_{i=1}^{2} q_i f_i(q_1, q_2) \), we have:

\[
\frac{\partial V(q_1^*, q_2^*)}{\partial q_i} = f_i(q_1^*, q_2^*) + q_i^* \left( \frac{\partial f_i(q_1^*, q_2^*)}{\partial q_i} \right) + q_2^* \left( \frac{\partial f_2(q_1^*, q_2^*)}{\partial q_i} \right) = 0 . \tag{25}
\]

Because \( q_i^* > 0 \) and \( \frac{\partial f_2}{\partial q_i} < 0 \), equation (25) implies that:

\[
f_i(q_1^*, q_2^*) + q_i^* \left( \frac{\partial f_i(q_1^*, q_2^*)}{\partial q_i} \right) > 0 \tag{26}
\]

Also, we have:

\[
\frac{\partial V(\hat{q}_1, 0)}{\partial q_i} = f_i(\hat{q}_1, 0) + \hat{q}_1 \left( \frac{\partial f_i(\hat{q}_1, 0)}{\partial q_i} \right) = 0 . \tag{27}
\]

Because \( q_i^* > 0 \) and because \( \frac{\partial f_1}{\partial q_i} < 0 \) and \( \frac{\partial^2 f_1}{\partial q_i \partial q_j} \leq 0 \), equations (26) and (27) indicate that \( \hat{q}_i > q_i^* \).

Similarly, \( \hat{q}_2 > q_2^* \). \( \square \)

Lemma 1: The firms’ joint surplus from sales to type 1 consumers is maximized with

\( q_1^i = \frac{a}{2} \) and \( q_2^i = 0 \); these quantities are sustained by prices \( p_1 = \frac{B}{2} \) and \( p_2 \in [\frac{1}{2}, 1] \).

**Proof:** The firms’ joint surplus from sales to type 1 consumers is \( p_1 q_1^i + p_2 q_2^i \), or using equations (12) and (13):

\[
V(q_1^i, q_2^i) = q_1^i \left( \beta \left( 1 - \frac{q_1^i}{a} \right) - \frac{q_2^i}{a} \right) + q_2^i \left( 1 - \frac{q_1^i}{a} - \frac{q_2^i}{a} \right) . \tag{28}
\]
First order conditions that are sufficient for maximizing this expression are:

\[
\frac{\partial V}{\partial q_i^l} = \beta \left( I - \frac{q_i}{a} \right) - \frac{2q_i}{a} - \frac{\beta q_i}{a} = 0
\]

(29)

\[
\frac{\partial V}{\partial q_i^r} = -\frac{2q_i}{a} + 1 - \frac{2q_i}{a} = 0
\]

Solving the equations in (29) simultaneously gives \( q_i^l = \frac{a}{2} \) and \( q_i^r = 0 \), which quantities are demanded by type 1 consumers with \( p_i = \frac{\beta}{2} \) and \( p_2 \in \left[ \frac{1}{2}, 1 \right] \). □

**Proposition 4**: If the retailer opts for an exclusive supplier, the firm buys \( \hat{q}_1 = \frac{1}{2} \) units from manufacturer 1 for \( \hat{q}_1 = \frac{B(2a-1)(\beta-1)}{4(a+\beta-a\beta)(1-a+a\beta)} \). The retailer charges consumers \( \hat{p}_1 = \frac{\beta}{2(a+\beta-a\beta)} \).

**Proof**: Equations (21) and (22) together show that \( \hat{q}_1 = \frac{1}{2} \) and \( \hat{p}_1 = \frac{\beta}{2(a+\beta-a\beta)} \). Substituting the values of \( V(\hat{q}_1,0) \) and \( V(0,\hat{q}_2) \) in equation (22) and (23) into equation (6) gives

\[
\hat{T}_1 = \frac{B(2a-1)(\beta-1)}{4(a+\beta-a\beta)(1-a+a\beta)}.
\]

**Proposition 6**: \( \hat{\pi}_i < \pi_i^* \) for \( i = 1, 2 \) iff \( \beta \leq \frac{1+a}{a} \)

**Proof**: Equations (19) and (23) show that \( \hat{\pi}_2 < \pi_2^* \). Also, **Proposition 4** and equations (18) and (24) indicate that \( \hat{\pi}_1 < \pi_1^* \) iff:

31
\[
\frac{(2a-1)(\beta-1)}{(a+\beta-a\beta)(1-a+a\beta)} < \frac{a}{2}.
\] (30)

This inequality holds for any \(a \in \left(\frac{1}{2}, 1\right)\) and \(\beta < \frac{1+a}{a}.\) □

**Proposition 7:** Consumer welfare is greater with an exclusive supplier iff \(\beta \geq \frac{4a}{4a-1}.\)

**Proof:** Proposition 3 gives the values of prices and quantities in the equilibrium without exclusivity. With these values, consumers’ surplus is:

\[
S^* = \frac{\beta}{8}
\] (31)

**Proposition 4** gives the values of \(\hat{p}_i\) and \(\hat{q}_i\) in the equilibrium with an exclusive supplier. With these values, consumers’ surplus is:

\[
\hat{S} = \frac{-4\beta^2a^2 + 8\beta a^2 - 4a^2 + 4\beta^2a - 8\beta a + 4a + \beta}{8(a + \beta - a\beta)}
\] (32)

Comparing expressions (31) and (32), we get:

\[
\hat{S} \geq S^* \text{ iff } \beta \geq \frac{4a}{4a-1}
\] (33)

which establishes the result. □

**Proposition 8:** Total welfare is less with an exclusive supplier iff \(\beta \leq \frac{1+a}{a}\)

**Proof:** The prices and quantities in Proposition 3 indicate that total welfare in the equilibrium without exclusivity is:

\[
W^* = \frac{3\beta}{8}
\] (34)
The values of $\hat{p}_1$ and $\hat{q}_1$ in Proposition 4 indicate that total welfare in the equilibrium with an exclusive supplier is:

$$\hat{W} = \frac{-4\beta^2a^2 + 8\beta a^2 - 4a^2 + 4\beta^2a - 8\beta a + 4a + 3\beta}{8(a + \beta - a\beta)} \quad (35)$$

Comparing expressions (34) and (35), we get:

$$\hat{W} \leq W^* \text{ iff } \beta \leq \frac{1+a}{a} \quad (36)$$

which establishes the result. □
References


