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**THE COUNTERVAILING
POWER HYPOTHESIS
AND CONTINGENT CONTRACTS**

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The countervailing power hypothesis and contingent contracts*

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Abstract

We consider a downstream oligopoly model with one dominant and several fringe retailers who purchase a manufacturing product from a monopoly supplier. We examine how contract type influences the relationship between the dominant retailer's bargaining power and the equilibrium retail price. If the contracts between the supplier and fringe retailers are contingent on the bargaining outcome between the supplier and the dominant retailer, the bargaining power does not affect the retail price. In contrast, if contracts with fringe retailers are not contingent, the relationship between bargaining power and retail price can be either positive or negative.

JEL codes: L13, D43.

Keywords: Countervailing power, Buyer power, Dominant retailer, Two-part tariff, Contingent contract.

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I Introduction

The countervailing power of large retailers over manufacturers can induce lower wholesale prices, which can cancel out the negative effects of their market power over consumers (e.g., Galbraith, 1952), although policymakers have serious concerns about the market power of large retailers over consumers. To theoretically investigate the effect of countervailing power on consumer and social welfare, some researchers of industrial organization provide market environments in which the countervailing power of retailers contributes to a reduction in retail prices (e.g., Dobson and Waterson, 1997; Iozzi and Valletti, 2014; Gaudin, 2018; Ghosh et al., 2022).

In addition to the above, policymakers also have concerns that the countervailing power of large retailers may harm small retailers through distortions of those small retailers' procurement conditions, the so-called 'waterbed effect' (e.g., Thomas, 2018). More concretely, the countervailing power of a large retailer makes it possible to procure a large amount of input/product owing to its good procurement conditions. Such a great demand of the large retailer for the supplier's input/product implies a large disagreement payoff of the supplier in negotiations with small retailers. In other words, a retailer's countervailing power can foreclose small retailers.¹

To investigate the impact of a large retailer's countervailing power on market outcomes, we construct an oligopoly model with a dominant retailer as follows: A monopoly supplier supplies products via two types of retailers. The first type of retailer is the dominant retailer with a positive constant marginal cost. They negotiate the term of the trade (a two-part tariff contract) through Nash bargaining *after* the determination of a non-discriminatory two-part tariff contract to the fringe retailers. The second type consists of fringe retailers whose marginal costs increase in quantity. Each fringe retailer takes a retailer price set by the

¹ Theoretical analyses on the waterbed effect are engaged by Majumdar (2005), Inderst and Wey (2003, 2007), Inderst (2007), and Inderst and Valletti (2011).

dominant retailer, as given, sets its own quantity and competes with the dominant retailer for market demand. Each fringe retailer receives a take-it-or-leave-it *contingent contract* from the monopoly supplier. The contingent contract includes two types of non-discriminatory two-part tariffs for fringe retailers. The first type of two-part tariff is applied if the negotiation between the supplier and dominant retailer reaches an agreement. If the negotiation between the supplier and the dominant retailer breaks down, the second type of two-part tariff is applied, and as in Christou and Papadopoulos (2015), the retail price is determined to equalize the total quantity supplied by fringe retailers.

Contingent contracts are a new element proposed in this study. In the negotiation procedure in the dominant retailer model, as in Chen (2003) (also in Bedre-Defolie and Shaffer (2011); Christou and Papadopoulos (2015); Matsushima and Yoshida (2018)), the supplier and the dominant retailer negotiate their trading terms *after* the non-discriminatory contract to the fringe retailers is determined. This contract sequence implies that the supplier can use a contingent contract when it offers a non-discriminatory contract to fringe retailers. As a non-contingent contract is a special case of a contingent contract, employing a contingent contract must increase the profitability of the supplier, who can *unilaterally* set its trading terms with fringe retailers. Therefore, if it is easy to verify that negotiation with the dominant retailer breaks down, the supplier should offer a contingent contract to the fringe retailers.²

The modification of Chen's (2003) dominant retailer model contributes to the literature on the buyer-supplier relationship. Since the seminal work by Binmore et al. (1986), many related papers in the context of buyer-supplier relations carefully treat disagreement payoffs of players (e.g., Horn and Wolinsky, 1988; Dobson and Waterson, 1997; Milliou and Petrakis, 2007; Iozzi and Valletti, 2014; Bacchiega et al., 2018). Following the assumption in Bacchiega et al. (2018), we propose a possible modification to the dominant retailer model originally suggested by Chen (2003).

² This is not always true if the contract terms are determined through a negotiation between parties with positive bargaining power (see, Bacchiega et al., 2018).

We show that the countervailing power of the dominant retailer is neutral to the equilibrium retail price if the supplier can offer a contingent contract, which depends on whether negotiation with the dominant retailer reaches an agreement in the first stage. We also show that the dominant retailer’s countervailing power influences the equilibrium retail price if the supplier cannot offer such a contingent contract. Specifically, increasing the countervailing power diminishes the equilibrium retail price if the specified inverse demand function is convex in quantity. Moreover, countervailing power augments the equilibrium retail price if the specified inverse demand function is concave in quantity. Our results imply that there is no clear relationship between the countervailing power of dominant retailers and retail price, in contrast to the countervailing power hypothesis.

This study is as an extension of Chen (2003), Bedre-Defolie and Shaffer (2011), and Christou and Papadopoulos (2015).³ By modifying Chen’s (2003) setting, Bedre-Defolie and Shaffer (2011) reconsider the countervailing power hypothesis. Their model differs from that of Chen (2003) in that (i) the supplier offers a linear contract to fringe retailers, which differs from those in the other two studies; and (ii) the supplier’s disagreement payoff is the payment from the fringe retailers, in which the retail price is determined by the demand-equal-supply condition, which is also employed in Christou and Papadopoulos (2015).⁴ Bedre-Defolie and Shaffer (2011) show that the convexity/concavity of fringe supply functions influences the relationship between the retail price and bargaining power of the dominant retailer if fringe retailers are active. Our study is a direct extension of Christou and Papadopoulos (2015) in that we allow for more generalized demand and cost functions and consider contract contingency which has not been considered in the context of countervailing power.

³ In a different study, Matsushima and Yoshida (2018) examine a negative relation between the retail price and the dominant retailer’s bargaining power over the supplier under the assumption that the market demand shrinks due to a breakdown in bargaining between the supplier and the dominant retailer, who works as a sales promoter for the product. Erutku (2005), which is an extension of Chen (2003), and Matsushima (2017) investigate purchasing power in different multichannel models.

⁴ In addition to the two aspects, Bedre-Defolie and Shaffer (2011) further investigate the possibility that fringe retailers are inactive because of a prohibitively high wholesale price for them.

The remainder of this paper is organized as follows. The model is described in Section 2. Section 3 presents the equilibrium outcomes and results of comparative statics. Finally, Section 4 concludes the paper.

II Model

This section presents the basic model, an extension of Chen (2003), Bedre-Defolie and Shaffer (2011), and Christou and Papadopoulos (2015). Consider a monopoly supplier that produces an intermediate good without any cost and one dominant and n fringe retailers that purchase the intermediate good from the supplier. Each retailer converts one unit of the intermediate good to one unit of the final good at no cost. However, each retailer incurs an operational cost to handle final goods. The dominant retailer has a constant marginal cost $c > 0$ to handle one unit of the final good. In contrast, each fringe retailer has an increasing marginal cost $MC(q_f)$, where q_f is its quantity, $MC'(q_f) > 0$ and $MC(0) = 0$.⁵ These assumptions reflect that fringe retailers are more efficient at small operational scales, whereas the dominant retailer is more efficient at a large scale.

The demand function for the final good is given as $D(p)$, where $D'(p) < 0$ and $D'(p) + (p - c)D''(p) < 0$, as assumed in Chen (2003).⁶

The dominant retailer negotiates with the supplier over a two-part tariff contract $w_d q_d + F_d$, where w_d is the wholesale price, q_d is the quantity purchased by the retailer, and F_d is the fee.

In Stage 1, the monopoly supplier unilaterally offers a contingent two-part tariff contract $(w_f^A, F_f^A; w_f^D, F_f^D)$ to each fringe retailer, where w_f is the wholesale price, F_f is the fee, and the superscript A (D) indicates the contract term when the supplier and the dominant retailer agree (disagree).⁷ The supplier commits offers. Fringe retailers are price-takers in both the

⁵ The assumption $MC(0) = 0$ follows those in Chen (2003) and Christou and Papadopoulos (2015). Bedre-Defolie and Shaffer (2011) assume that $MC(0) = c$, which implies that the dominant retailer is always more efficient than fringe retailers.

⁶ Christou and Papadopoulos (2015) employ a linear demand.

⁷ Bedre-Defolie and Shaffer (2011) assume that the supplier offers a common linear contract to each fringe retailer.

input and final goods markets. Under this assumption, we derive the supply function of each fringe retailer. It is derived from $p = MC(q_f) + w_f$ or $q_f = MC^{-1}(p - w_f)$. Here, we define $s(p - w_f) \equiv MC^{-1}(p - w_f)$, where $s(0) = 0$ and $s'(\cdot) > 0$.

In Stage 2, the supplier and the dominant retailer negotiate over the two-part tariff contract, $w_d q_d + F_d$. The bargaining power of a dominant retailer is $\gamma \in (0, 1)$.

In Stage 3, considering fringe retailers' production technology, the dominant retailer sets the retail price p . Given p , each fringe retailer determines its quantity. If the negotiation breaks down in Stage 2, p is determined to equalize demand $D(p)$ and the total quantities supplied by the fringe retailers. This condition is further explained in Section 3.

III Equilibrium outcome

Our main objective is to discuss how contract type influences the equilibrium property. First, we solve the game under a contingent contract using backward induction. Second, we modify this game by considering a non-contingent contract in that the two-part tariff contract for each fringe retailer does not depend on whether the dominant retailer signs a contract with the supplier; that is, we modify the contract space $(w_f^A, F_f^A) = (w_f^D, F_f^D)$ in the second scenario. Here, we focus only on an interior solution in which the dominant retailer and each of the fringe retailers are active in equilibrium.⁸

III(i) Contingent contract

We consider the game under a contingent contract.

⁸ Bedre-Defolie and Shaffer (2011) carefully discuss a possibility that fringe retailers are inactive if a common wholesale price for them is prohibitively high. We guess that the scenario is less likely to occur in our model because we assume that the supplier offers a common two-part tariff to fringe retailers, allowing the supplier to fully extract the rents of those fringe retailers.

Stage 3 Given the agreement of the negotiation between the supplier and the dominant retailer, we have already derived the supply function of each fringe retailer, $s(\cdot)$:

$$q_f(p - w_f^A) = s(p - w_f^A).$$

The residual demand of the dominant retailer is given by $D(p) - ns(p - w_f^A)$. Thus, the dominant retailer's profit becomes

$$\pi_d = (p - c - w_d)[D(p) - ns(p - w_f^A)] - F_d.$$

From the first-order condition of its profit maximization problem, we obtain the optimal price $p^*(w_d, w_f^A) = p^*$ such that

$$[D(p^*) - ns(p^* - w_f^A)] + (p^* - c - w_d)[D'(p^*) - ns'(p^* - w_f^A)] = 0. \quad (1)$$

Note that $\partial p^*(w_d, w_f^A)/\partial w_d > 0$ from the second-order condition.

Stage 2 (bargaining outcome) Anticipating the third-stage outcome, the supplier and the dominant retailer negotiate over the two-part tariff contract, $w_d q_d + F_d$. Let π_s be the monopoly supplier's profit. The bargaining problem is $B_d^s = \{\pi_s, \pi_d\}$, with the disagreement payoffs for the supplier and the dominant retailer being (O_s, O_d) , where:

$$\pi_s(w_d, w_f^A, F_d, F_f^A) = F_d + w_d[D(p^*(w_d, w_f^A)) - ns(p^*(w_d, w_f^A) - w_f^A)] \quad (2)$$

$$+ n[F_f^A + w_f^A s(p^*(w_d, w_f^A) - w_f^A)],$$

$$\pi_d(w_d, w_f^A, F_d) = (p^*(w_d, w_f^A) - c - w_d)[D(p^*(w_d, w_f^A)) - ns(p^*(w_d, w_f^A) - w_f^A)] - F_d \quad (3)$$

$$O_s(w_f^D, F_f^D) = n[F_f^D + w_f^D s(p_o - w_f^D)],$$

$$\text{where } p_o \text{ satisfies } D(p_o) = ns(p_o - w_f^D), \quad (4)$$

$$O_d = 0.$$

The equation, $D(p_o) = ns(p_o - w_f^D)$ in equation (4), is the demand-equal-supply condition, in which the negotiation between the supplier and the dominant retailer breaks down.

By solving the following maximization problem, we derive the outcome of bargaining:

$$\max_{(w_d, F_d)} [\pi_s(w_d, w_f^A, F_d, F_f^A) - O_s(w_f^D, F_f^D)]^{1-\gamma} [\pi_d(w_d, w_f^A, F_d)]^\gamma.$$

First, F_d must satisfy the following:

$$\begin{aligned} F_d^* = & (1 - \gamma)[p^* - c][D(p^*) - ns(p^* - w_f^A)] \\ & - w_d[D(p^*) - ns(p^* - w_f^A)] - n\gamma[F_f^A + w_f^A s(p^* - w_f^A)] + \gamma O_s(w_f^D, F_f^D). \end{aligned} \quad (5)$$

The problem becomes as follows:

$$\max_{w_d} \pi_s(w_d, w_f^A, F_d, F_f^A) + \pi_d(w_d, w_f^A, F_d) - O_s(w_f^D, F_f^D).$$

That is,

$$\max_{w_d} (p^* - c)[D(p^*) - ns(p^* - w_f^A)] + n[F_f^A + w_f^A s(p^* - w_f^A)] - O_s(w_f^D, F_f^D). \quad (6)$$

The first-order condition with respect to w_d is

$$\frac{\partial p^*}{\partial w_d} \{ [D(p^*) - ns(p^* - w_f^A)] + (p^* - c)[D'(p^*) - ns'(p^* - w_f^A)] + nw_f^A s'(p^* - w_f^A) \} = 0, \quad (7)$$

Or

$$[D(p^*) - ns(p^* - w_f^A)] + (p^* - c)[D'(p^*) - ns'(p^* - w_f^A)] + nw_f^A s'(p^* - w_f^A) = 0. \quad (8)$$

Define $w_d^* = w_d(w_f^A)$. The second-order condition is

$$\begin{aligned} & \frac{\partial^2 p^*}{\partial w_d^2} \{ [D(p^*) - ns(p^* - w_f^A)] + (p^* - c)[D'(p^*) - ns'(p^* - w_f^A)] + nw_f^A s'(p^* - w_f^A) \} \\ & + \frac{\partial p^*}{\partial w_d} \{ 2D'(p^*) + (p^* - c)D''(p^*) - 2ns'(p^* - w_f^A) - n(p^* - c - w_f^A)s''(p^* - w_f^A) \} < 0. \end{aligned}$$

Because the first line becomes zero (by substituting equation (8)) in equilibrium, we have

$$[2D'(p^*) + (p^* - c)D''(p^*)] - n[2s'(p^* - w_f^A) + (p^* - c - w_f^A)s''(p^* - w_f^A)] < 0. \quad (9)$$

Stage 1 From (2) and (5), and the fact that the supplier extracts the full surplus of each fringe retailer through F_f^A ($F_f^A = \int_0^{p^{**}-w_f^A} s(x)dx$), the objective of the supplier is to maximize the following π_S by controlling w_f^A , w_f^D , and F_f^D (we define $p^{**} \equiv p^*(w_d^*, w_f^A)$)

$$\begin{aligned}
& \pi_S(w_d^*, w_f^A, w_f^D, F_d^*, F_f^A, F_f^D) \\
&= F_d^* + w_d^*[D(p^{**}) - ns(p^{**} - w_f^A)] + n[F_f^A + w_f^A s(p^{**} - w_f^A)] \\
&= (1 - \gamma)[p^{**} - c][D(p^{**}) - ns(p^{**} - w_f^A)] - w_d(w_f^A)[D(p^{**}) - ns(p^{**} - w_f^A)] \\
&\quad - n\gamma \left[\int_0^{p^{**}-w_f^A} s(x)dx + w_f^A s(p^{**} - w_f^A) \right] + \gamma O_s(w_f^D, F_f^D) \\
&\quad + w_d(w_f^A)[D(p^{**}) - ns(p^{**} - w_f^A)] + n \left[\int_0^{p^{**}-w_f^A} s(x)dx + w_f^A s(p^{**} - w_f^A) \right] \\
&= (1 - \gamma) \left\{ [p^{**} - c][D(p^{**}) - ns(p^{**} - w_f^A)] + n \left[\int_0^{p^{**}-w_f^A} s(x)dx + w_f^A s(p^{**} - w_f^A) \right] \right\} \\
&\quad + \gamma O_s(w_f^D, F_f^D). \tag{10}
\end{aligned}$$

From the above maximization problem, γ does not influence the equilibrium wholesale prices (w_f^A, w_f^D). Thus, we obtain the following result:

Proposition 1 *The countervailing power does not affect the equilibrium wholesale and retail prices.*

The key point is the separation of the controls on the total industry profits and the supplier's disagreement payoff.

III(ii) Non-contingent contract

Here, we modify this game in the previous subsection by considering a non-contingent contract, that is, we consider a two-part tariff contract, $(w_f^A, F_f^A) = (w_f^D, F_f^D)$, to each fringe retailer. We simply replace w_f^D and F_f^D with w_f^A and F_f^A respectively, and omit superscript A . The replacement does not change the analytical property in the second and third stages but does

change the supplier's objective in the first stage, as follows:

$$\begin{aligned} & \pi_s(w_d^*, w_f, F_d^*, F_f) \\ = & (1 - \gamma) \left\{ [p^{**} - c][D(p^{**}) - ns(p^{**} - w_f)] + n \left[\int_0^{p^{**} - w_f} s(x) dx + w_f s(p^{**} - w_f) \right] \right\} \\ & + \gamma O_s(w_f, F_f). \end{aligned} \quad (11)$$

We find that only the last terms, $\gamma O_s(\cdot)$, in (10) and (11) are different. The difference substantially changes the relationship between γ and p^{**} because equation (11) implies that the supplier balances the direct profit from the two channels (the first term) and the indirect profit from the disagreement payoff (the second term).

In contrast to the contingent contract case, the neutral result holds no longer. We can verify that the effects of γ on w_f , w_d , and p are ambiguous. To check the relationship between the prices and bargaining power numerically, we assume that $p(Q) = (a - bQ)^\alpha$, $s(\cdot) = (\frac{p - w_f}{d})^\beta$. This functional assumption enables us to examine both concave and convex demand and supply functions. The parameter settings with $\alpha = 1$ and $\beta = 1$ coincide with Chiristou and Papadopoulos (2015). Figure 1 shows that the relationship between bargaining power and retail price can be positive or negative, and the concavity/convexity of demand and supply functions plays an essential role. Note that when $\alpha > 1$ and $\beta = 1$ ($p(Q)$ is concave), the countervailing power of the dominant retailer can increase the equilibrium retail price and thus reduce the consumer surplus. Our results imply that there is no clear relationship between the countervailing power of dominant retailers and retail price, in contrast to the countervailing power hypothesis.

IV Conclusion

We consider a downstream oligopoly model with one monopoly supplier, one dominant retailer, and fringe retailers by considering a contingent contract for the fringe retailers. This contract depends on whether the negotiation between the supplier and the dominant retailer reaches an agreement. We show that the dominant retailer's countervailing power is neutral to the

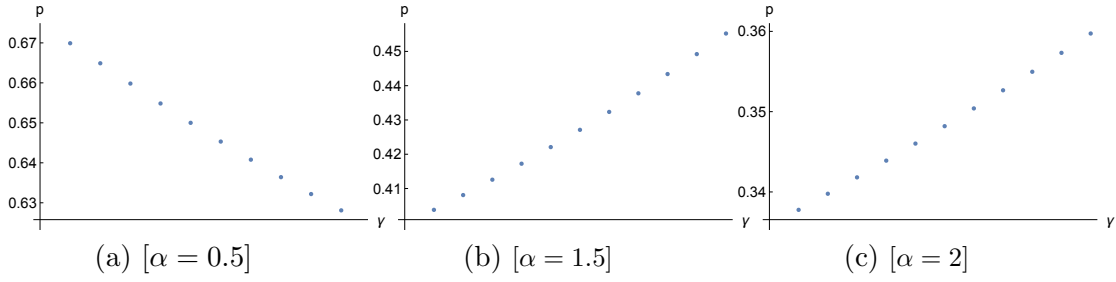


Figure 1: Relationship between retail price and bargaining power.
 $[a = 1, b = 1, c = 1/100, d = 10, n = 4, \beta = 1]$

equilibrium retail price if the supplier can offer a contingent contract, which depends on whether the negotiation with the dominant retailer reaches an agreement. We also show that the countervailing power of the dominant retailer influences the equilibrium retail price if the supplier cannot offer such a contingent contract. Specifically, an increase in the countervailing power diminishes the equilibrium retail price if the specified inverse demand function is convex in quantity. Moreover, countervailing power augments the equilibrium retail price if the specified inverse demand function is concave in quantity. Our results imply that there is no clear relationship between the countervailing power of dominant retailers and retail price in contrast to the countervailing power hypothesis.

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