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Access charge, vertical separation, and lobbying

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Access Charge, Vertical Separation, and Lobbying

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Abstract

We investigate the manner in which vertical separation affects lobbying activities as well as the access charges for essential facilities. We find that vertical separation either increases or decreases the access charge, and this depends on the relative efficiency between the incumbent and new entrants.

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1 Introduction

Competition between a firm holding essential facilities (usually, a dominant firm) and firms not holding them has been widely observed in many industries such as overnight delivery, telecommunication, electric power, and natural gas distribution industries. In particular, in Japan, dominant firms are not vertically separated in telecommunication, electric power, and gas distribution industries. Dominant firms were previously legal monopolists, and they have had to compete against new entrants after the liberalization of these markets. New entrants pay an access charge to the dominant firms. The rate of this charge affects the new entrants' marginal costs, and hence, it significantly affects the performance of the markets.

The rate of access charge (input price) is typically regulated by the government. Considerable literature on the desirable and/or existing rules for levying access charges, such as efficient component pricing rule (ECPR), total element long run incremental cost (TELRIC), and a historical cost approach, exists[1]; moreover, currently, charges based on the costs of essential facilities are levied all over the world. For example, in Japan, TELRIC has been adopted in the traditional local telecommunication network, and the historical cost approach has been adopted in the optical fiber network, electric power, and natural gas distribution industries. In the EU, although the rules are different for different countries, the cost-based approach has been adopted in most industries and in most countries.

In principle, the rule for calculating the rate of charge is determined by a neutral government, and there is no room for manipulation. In practice, however, firms often influence the access charge through lobbying and/or manipulation of accounting costs.[2] For example, in Japan, integrated gas companies insisted that the costs of vaporizers and pumps of liquidated natural gas (LNG) tanks should be included in the access charge accounting of gas distribution pipeline networks. They made substantial efforts to rationalize their argument at the government committee (Gas Energy Committee in the Advisory Committee for Natural Resource and Energy) that determines the rules for access charge accounting. Eventually, they succeeded in persuading the committee to adopt a resolution to include these costs in the current access charge. Similar instances have been widely

[1] See, among others, Laffont and Tirole (1994), Economides and White (1995), Armstrong et al. (1996), Hausman (1997), and Sappington (2006). See also Hori and Mizuno (2006), Mizuno and Shinkai (2006), Ida and Anbashi (2008), and Gautier and Mitra (2008) for the dynamic efficiency of access charge rules.

[2] For discussions on these activities in the general context of regulation policies, see Viscusi et al. (2005).

observed in the telecommunication and electric power distribution industries in Japan. In this paper, we consider a situation wherein the access charge is influenced by firms through lobbying activities.

Another important topic in policy is whether a dominant firm should be allowed to hold an essential facility. Vertical separation is always an important policy issue in this field, and ownership unbundling has been widely observed, especially in the EU. It is often insisted that vertical separation is beneficial because it deters manipulation by vertically integrated firms.

In this paper, we discuss the manner in which vertical separation affects the rate of access charge. We find that vertical separation decreases the lobbying activities and thereby reduces the rate of access charge if the incumbent is considerably less efficient than the new entrant. However, this result is ambiguous when the cost differences between the firms is small, and it is possible that vertical separation increases lobbying activities and thereby increases the rate of access charge. We also find that vertical separation can be harmful for welfare.

2 The Model

We consider two cases: (1) a vertically integrated firm holding an essential facility and (2) vertical separation undertaken by the government.

2.1 Vertically integrated case

We consider a duopoly model. Firm 1 is a vertically integrated firm holding an essential facility (dominant firm), and firm 2 is a new entrant. Firm 2 accesses the essential facility held by firm 1 and pays an access charge ry_2 to firm 1, where $r \in [0, \bar{r}]$ is per unit access charge and y_i is firm i's output.[3]

In the first stage, the per unit access charge (input price) r is determined. Let $L(r)$ denote firm 1's effort costs (costs incurred for lobbying activity, manipulation of access charge accounting, etc.). In the second stage, firms engage in Cournot competition. They simultaneously produce perfectly homogeneous products for which the market demand function is given by $p = a - Y$ (price as a function of quantity), where Y is the total output of the duopolists. Firm 2's production cost

[3] In many countries, the sales and productions departments in the vertically integrated firms pay access charges to their own network departments which hold essential facilities in accounting. However, this accounting system does not affect the optimal outputs in the integrated firms as long as they maximize the joint profits of both departments.

(except for access charge) is normalized to zero and firm 1's marginal production cost is denoted by c. If c is positive (negative), firm 1 is less (more) efficient than firm 2. Let y_i denote the output of firm i. Firm 1's profit is $\pi_1 = (p(Y) - c)y_1 + ry_2 - L(r)$, and firm 2's profit is $\pi_2 = (p(Y) - r)y_2$. We assume that $L'(r) \geq 0$ and that $L''(r)$ is positive and sufficiently large in order to ensure the concavity of firm 1's payoff function. We assume that $L'(0) = 0$ and that $L'(\bar{r})$ is sufficiently large in order to ensure interior solutions in the first stage (i.e., the equilibrium $r \in (0, \bar{r})$). We also assume that $-(a - 2\bar{r}) < c < a/2$ to ensure interior solutions in the second stage (production stage).

Consider the second stage. The reaction functions of firms at the second stage are given by

$$R_1(y_2) = \frac{a - c - y_2}{2}, \qquad R_2(y_1) = \frac{a - r - y_1}{2}. \tag{1}$$

The resulting equilibrium outputs and profits are as follows:

$$y_1^{IS} = \frac{a - 2c + r}{3}, \qquad y_2^{IS} = \frac{a - 2r + c}{3}, \qquad Y^{IS} \equiv y_1^{IS} + y_2^{IS} = \frac{2a - r - c}{3}, \tag{2}$$

$$\pi_1^{IS} = \frac{(a - 2c + r)^2}{9} + \frac{r(a - 2r + c)}{3} - L(r), \qquad \pi_2^{IS} = \frac{(a - 2r + c)^2}{9}, \tag{3}$$

where the superscript IS denotes the equilibrium outcomes under vertical integration at the second stage. The resulting total social surplus (consumer surplus plus the profits of the two firms) is given by[4]

$$W^{IS} = \frac{8a^2 - 2a(r + c) - (r + c)^2}{18} - \frac{c(a - 2c + r)}{3} - L(r). \tag{4}$$

In the first stage, firm 1 maximizes π_1^{IS} with respect to r. The first-order condition is

$$\frac{\partial \pi_1^{IS}}{\partial r} = \frac{5(a - 2r)}{9} - \frac{c}{9} - L'(r) = 0. \tag{5}$$

Let the superscript I denote the subgame perfect Nash equilibrium (SPNE) outcomes under vertical integration. r^I is derived from (5).

2.2 Vertically separated case

We consider the situation wherein vertical separation is undertaken by the government. Firm 0 holds the essential facility, and firms 1 and 2 pay access charges to firm 0. In the first stage, firm 0 chooses r with cost $L(r)$. After observing r, firms 1 and 2 compete in terms of output. Firm 0's

[4] If the lobbying costs are not real social costs but only income transfers from the firm to regulators or lawyers, it might be better not to subtract $L(r)$ in (4). All our results hold true if we do not subtract $L(r)$ from welfare.

profit is given by $\pi_0 = r(y_1 + y_2) - L(r)$, firm 1's profit is given by $\pi_1 = (p(Y) - c - r)y_1$, and firm 2's profit is given by $\pi_2 = (p(Y) - r)y_2$. Again, in the second stage, firms 1 and 2 engage in Cournot competition.

We discuss the second stage subgame where r is given exogenously. The equilibrium outputs are as follows:

$$y_1^{SS} = \frac{a - 2c - r}{3}, \qquad y_2^{SS} = \frac{a - r + c}{3}, \qquad Y^{SS} = \frac{2a - 2r - c}{3}, \tag{6}$$

where the superscript SS denotes the equilibrium outcome under vertical separation at the second stage game. The resulting profits of firms 0–2 are given by

$$\pi_0^{SS} = \frac{r(2a - 2r - c)}{3} - L(r), \quad \pi_1^{SS} = \frac{(a - 2c - r)^2}{9}, \quad \pi_2^{SS} = \frac{(a - r + c)^2}{9}. \tag{7}$$

The resulting total social surplus is given by

$$W^{SS} = \frac{8a^2 - 2a(2r + c) - (2r + c)^2}{18} - \frac{c(a - 2c - r)}{3} - L(r). \tag{8}$$

In the first stage, firm 0 maximizes its profit with respect to r. The first-order condition is given by

$$\frac{\partial \pi_0^{SS}}{\partial r} = \frac{2(a - 2r)}{3} - \frac{c}{3} - L'(r) = 0. \tag{9}$$

Let the superscript S denote the SPNE outcomes under vertical integration. r^S is derived from (9).

3 Results

Proposition 1 (i) If $c \leq 0$, then $r^S \geq r^I$. (ii) If c is sufficiently large, then $r^S < r^I$.

Proof: Comparing (5) with (9), we obtain $r^S > r^I$ when $c \leq 0$, and $r^S < r^I$ for large c. Q.E.D.

Firm 0 obtains access charge revenue from firms 1 and 2 under vertical separation, while firm 1 obtains access charge revenue from one firm (firm 2) only.[5] Thus, vertical separation increases the size of input market. As a result, firm 0 has a stronger incentive for increasing r than the integrated firm, firm 1 (input-market enhancing effect). On the other hand, under vertical integration, firm 1

[5] In the model of vertical integration, the network department of firm 1 might obtain access charge revenue from the retail department of firm 1. However, this merely indicates income transfer within the same firm; thus, firm 1 does not care about this transfer when it chooses r.

has an incentive to increase r so as to reduce its rival's output. For this strategic purpose, firm 1 has a stronger incentive for increasing r than the vertically separated firm, firm 0 (strategic effect).

The significance of the input-market enhancing effect is measured by $(y_1^{SS} + y_2^{SS}) - y_2^{IS}$. The smaller c is, the larger $(y_1^{SS} + y_2^{SS}) - y_2^{IS}$ is (and hence the stronger the input-market enhancing effect is). Thus, the input-market enhancing effect is more likely to dominate the strategic effect when c is smaller.[6]

Note that $c \leq 0$ is a sufficient, but not a necessary condition under which vertical separation increases the rate of access charge. Even with a positive c, it is possible that vertical separation increases r.

Next, we briefly discuss the welfare implications of vertical separation. Vertical separation yields a double-marginalization problem in firm 1 and then reduces firm 1's output. Although it increases firm 2's output, the total output decreases. When $c \leq 0$, the vertical separation reduces y_1 and Y and hence reduces welfare. According to Proposition 1(i), if $c \leq 0$, vertical separation increases r, which results in a welfare loss. Since both effects reduce welfare, vertical separation unambiguously reduces welfare.

Proposition 2 Vertical separation reduces welfare when $c \leq 0$.

However, when c is positive, the implications on welfare are ambiguous. When c is large, a reduction in firm 1's output and an increase in firm 2's output improve welfare because firm 2 is more efficient than firm 1 (total production costs are economized). This effect is known as the welfare-improving production substitution effect. Moreover, vertical separation decreases r (Proposition 1(ii)), resulting in a welfare gain. Although these two effects improve welfare, vertical separation induces a decrease in the total output, which reduces welfare. Thus, it is ambiguous whether the former welfare-improving effects dominate the latter welfare-reducing effect.

In our model, vertical separation reduces welfare when $c \leq 0$ (Proposition 2). However, we should not place excessive emphasis on this result. We have assumed that firm 0 (under vertical separation) and firm 1 (under vertical integration) have the same manipulation cost function $L(r)$. This assumption may not be realistic. Under vertical separation, the cost structure becomes more transparent and the disintegrated upstream firm has more difficulties in manipulating accounting

[6] This result does not depends on the assumption of Cournot competition. If we consider Bertrand model with product differentiation, we can show that vertical separation increases (reduces) r when c is small (large) enough.

costs. In such situations, the rate of access charge is lower than that predicted by our model. Thus, our model might underestimate the gains of vertical separation.

Although the number of firms in the product market is given exogenously in this paper, the entries of independent firms (the long-run effect) must change the results. Under vertical separation, the firm holding an essential facility (firm 0) has an incentive to reduce r in order to stimulate new entries. On the contrary, the vertically integrated firm has an opposite strategic incentive. It strategically increases r in order to deter further entries. Thus, if we consider a possible further new entry, vertical separation might reduce r even when the incumbent is as efficient as the new entrants. This topic should also be examined in future research.

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