

TRADE CONTESTS WITH ACTIVE CONSUMERS

SOO JEOUNG SOHN*

This study examines a model of lobbying in international trade contests focused on contributions of the domestic firms, the foreign firms, and consumers, and their effect on the trade policy of government. I examine two questions related to lobbying contributions: (i) what is the determinant(s) of lobbying?; (ii) if consumers are active, is there any difference in the situation of the international trade compared to the situation in which consumers are inactive? Given active consumers and a group-specific public-good, I show that lobbying by the foreign firms may result in reduction of trade barriers, such as tariffs. And even though it is the international trade contest, sometimes the domestic firms and consumers compete among themselves except the foreign firms.

JEL Classification: D72; F13

Keywords: Contests; Lobbying Contributions; Tariff

I. INTRODUCTION

The propriety for protective tariffs is still under the controversy. Nevertheless, almost all countries have at least kind of protective tariffs. An example is the Korean tariff policy in the spring of 2001 to protect the domestic automobile industry: Korean producers want their government to set a tariff level of 8% on American cars imported into domestic market, while American producers want to set up the tariff level of 2.5% with the help of the American government. If a certain industry has a protective tariff, then domestic producers exert efforts to press their government for imposing a high tariff, while foreign producers exert efforts to lower such a tariff to enter the market.

Government policies on taxes, subsidies, regulations, etc., are influenced by

Received for publication: Nov. 9, 2004. Revision accepted: Dec. 31, 2004.

* Department of Economics, Sungkyunkwan University, Seoul 110-745, South Korea

Corresponding author. Tel.: +82-2-760-1294; fax: +82-2-744-5717.

E-mail address: sjsohn@skku.edu (S. Sohn).

firms' lobby. In the case of international trade, lobbying by firms plays an important role in shaping trade policies, such as tariffs, subsidies, and quotas. Therefore, firms have strong incentives to lobby to obtain favorable trade policies since firms can either have benefits or lost depending on the adopted policies.

This article examines contests between the domestic firms and the foreign firms regarding tariff levels when consumers also actively participate in the contests. I show that domestic consumer group can play a role similar to the foreign firms in trade contests.

I can classify the existing papers on lobbying in the context of trade into two groups. One group of papers has concentrated on rent seeking in which both firms and government are active, and, in their models, only the objective functions of firms are considered — in these papers, each firm chooses its contribution and output to maximize its own profit, and government sets its trade policy, more specifically, tariff, to maximize the weighted sum of contributions and aggregate welfare. Examples include Wellisz and Wilson (1986), Hillman and Ursprung (1988), Michaelis (1994), Long and Soubeyran (1996), and Pecorino (1998). The other group of papers has also studied rent seeking in which both firms and governments are active, but it is composed of the objective functions of government as well as firms. Thus, this literature shows not only the optimal lobbying contributions but also government's optimal tariff-setting through contributions. Papers in this group include Moore and Suranovic (1993), Grossman and Helpman (1994), (1995a), (1995b), Helpman (1997), Levy (1999), Coate and Morris (1999), and Mitra (1999). Helpman (1997) formulates the political-support-function approach in order to derive a formula for equilibrium tariff rates. He supposes that government's political support for a policy is an increasing function of the income gains of sector-specific inputs and of the aggregate welfare gain. Given all this, government chooses rates of protection to maximize its political support, from industry interests and from consumers.

Besides such theoretical studies, Gawande, et al, (2004) investigate, centering around foreign lobbies, the relationship between trade protection and lobbying activity empirically. They compile data on foreign political organization using U.S. government reports on the administration of the Foreign Agents Registration Act (FARA), and employ primarily data from the period 1978-1982 on U.S. manufacturing industries. They suggest that foreign lobbying has a statistically and economically significant impact on trade policy: The presence of an organized foreign lobby representing a particular industrial sector appears to have as much effect in lowering tariffs against imports in that sector as does the presence of domestic lobby in raising tariffs. And *ceteris paribus*, US consumers gain unambiguously from the presence of foreign political activity.

As mentioned above, the previous papers on trade lobbying consider only firms' lobbying except Helpman (1997). They do not take into account

consumers' lobbying to maximize their consumer surplus. But, in actuality, government's trade policy affects the domestic price, and this intently affects consumer surplus, such like Helpman (1997). Therefore, consumers have incentives to lobby.¹ What distinguishes this paper from those previous papers is that I incorporate consumers' lobbying. I would like to consider consumers as active players not passive players in setting up trade policy. In this paper, firms are assumed to maximize their profit functions which take account of lobbying contributions and the expected payoffs, and consumers are assumed to maximize their utility functions which take account of lobbying contributions and consumer surplus. As with the previous papers, I view government as a policy maker which pursues its own selfish interest, rather than as a benevolent one seeking to maximize aggregate welfare.

I consider a trade lobbying contest in which the domestic firms, the foreign firms, and one consumer group compete with one another. Then the lobbying expenditure levels are determined as the Nash equilibrium of a non-cooperative game in which each interest group chooses its lobbying expenditure so as to maximize net benefits. My approach focuses on features and incentives to engage in lobbying activities given that the domestic firms prefer high regulation on trade policy, while the foreign firms and consumer group prefer low regulation. It has two stages. In the first stage, firms and consumer group compete by making lobbying contributions to win their prizes. The prize for the domestic firms is the protection of domestic market by a "high" tariff and that for the foreign firms and consumer group is the opening of the market by a "low" tariff. In the second stage, after knowing government's decision on the tariff level, the domestic and the foreign firms choose their output levels. I obtain the equilibrium lobbying contributions of the domestic and the foreign firms and consumer group for the expected payoffs of the first-stage, and the equilibrium output levels for the expected payoffs of the second-stage. I show that the lobbying contributions depend on the players' valuations of the prizes and their abilities for lobbying. I also show that, if there is an active consumer group and the prize for each player is a group-specific public-good, the foreign firms or consumer group can be a free-rider. That is, the one who has the highest valuation on the prize makes a contribution, the other makes a zero

¹ Steel consumers hit Capitol Hill Wednesday to refocus attention on a trade bill that would allow steel mill products in short supply restriction-free entry to U.S. markets and also allow steel consumers an expanded role in future trade cases. The timing was not coincidental, coming as it did just a week after President Bush ordered import duties of up to 30 percent, angering steel consumers who believe the action will severely disrupt trade and hinder downstream manufacturers dependent on foreign steel sources. Last year, the Consuming industries Trade Action Coalition(CITAC) introduced the Transparency and Fairness Trade Act that includes a short-supply provision and gives downstream industries full-party status in trade cases. The bill has broader applications than steel, which is why steel consumers and lumber manufacturers from a dozen states met with approximately 60 lawmakers to press their trade legislation this week (*American Metal Market*, 10(50), March 2002).

contribution and thus become a free-rider. And their valuation depends on the tariff levels. Therefore, who becomes a free-rider depends on the tariff levels.

The remainder of the paper is organized as follows. In the next section, I set up the model. In Section III, I solve the second stage in which given the tariff level, firms choose their output levels. In Section IV, I analyze the first stage and obtain the equilibrium contributions of firms and consumer group. Section V examines the relation between the tariff level and a free-rider when there are active consumers. Finally, Section VI offers conclusions.

II. THE MODEL

The conventional domestic market has the sticky trade barrier by the very high tariff. Thus, there is no import from the foreign firms. But, now, this domestic market is under the pressure of the opening. Consider a situation in which domestic government has to decide tariff policy for the market. If the tariff set by government is "high enough," the foreign firms cannot enter into the market and thus only the domestic firms operate in the market. On the other hand, if the tariff is "low," the foreign firms earn positive profits by entering into the market, and the domestic firms earn less profits compared with the no-trade case. In the case of consumers, consumer surplus is higher when its market is open, since competition among more firms decreases the domestic price. That is, as the tariff is raised, the domestic firms obtain the gain, while consumers undergo the loss in consumer surplus. Since they have such conflicting payoffs, government should face the problem on choosing the tariff level. In this situation, the domestic firms lobby for a "high" tariff level, while the foreign firms and the domestic consumers lobby for a "low" tariff level. Given the tariff level imposed by government, firms choose outputs to maximize their profits. Therefore, the lobbying activity in this model is the exercise of political influence over government's economic decision-making through contributions.

I consider the following two-stage game. In the first stage, n identical domestic firms, m identical foreign firms, and one consumer group lobby to win their prizes. They choose their lobbying contributions simultaneously and independently. The prize for the domestic firms is government's decision to set a high level of the tariff and thus to prevent the foreign firms from entering into the market. The prize for the foreign firms and consumer group is a low tariff level and thus to open domestic market. In the second stage, after knowing government's decision on tariff policy, the domestic firms and the foreign firms choose their output levels simultaneously and independently to maximize their expected payoffs. Consider the first stage. Let s_i denote the contribution of domestic firm i in the first stage, and S represent the total contribution made by all the domestic firms: $S = \sum_{i=1}^n s_i$. Let y_j denote

contribution by foreign firm j in the first stage, and let Y represent the contribution made by all the foreign firms in the first stage: $Y = \sum_{j=1}^m y_j$. Let x be the contribution made by consumer group. Let $P(S, Y, x)$ be the probability that the domestic firms win their prize, given S , Y , and x .

I assume that the probability-of-winning function for the domestic firms takes a logit form²:

$$\begin{aligned} P(S, Y, x) &= \frac{\beta S}{\beta S + Y + x} & \text{for } S + Y + x > 0 \\ &= \frac{1}{2} & \text{for } S + Y + x = 0 \end{aligned} \quad (1)$$

where $\beta \geq 1$. The parameter β represents the domestic firms' lobbying ability relative to the foreign firms and consumer group. A value of β greater than unity implies that the domestic firms have more ability than the foreign firms and consumer group.³

Then, the probability that the foreign firms or consumer group wins is given by

$$\begin{aligned} 1 - P(S, Y, x) &= \frac{Y + x}{\beta S + Y + x} & \text{for } S + Y + x > 0 \\ &= \frac{1}{2} & \text{for } S + Y + x = 0 \end{aligned} \quad (2)$$

Domestic firm i 's expected payoff in the first stage is given by

$$\Pi_{di} = P(S, Y, x)(\pi_{di}^* - \pi_{di}^{**}) + \pi_{di}^{**} - s_i, \quad (3)$$

where π_{di}^* is domestic firm i 's expected payoff in the second stage resulting from a high tariff, and π_{di}^{**} is that resulting from a low tariff.

Let Π_{fj} denote foreign firm j 's expected payoff in the first stage. It is given by

$$\Pi_{fj} = (1 - P(S, Y, x))\pi_{fj}^{**} - y_j, \quad (4)$$

² This simplest logit-form probability-of-winning function is extensively used in the literature on rent seeking. Examples include Tullock (1980), Ursprung (1990), Baik (1994), and Baik and Shogren (1995).

³ Under the Buy-American Act, the United States Government offers a 6 percent preference for domestic supplies. This preference is raised to 12 percent in the case of small businesses and firms in regions of high unemployment, and 50 percent for military procurement. The Canadian Government offers a 10 percent preference based on Canadian content. The Australian Government gives a 20 percent preference for Australian content, while the New Zealand government gives a 10 percent preference (McAfee & McMillan, 1989).

where π_{fj}^{**} is foreign firm j 's expected payoff in the second-stage resulting from a low tariff.

Consumer group's expected payoff in the first stage is

$$\Pi_C = P(S, Y, x)(CS^* - CS^{**}) + CS^{**} - x \quad (5)$$

where CS^* is consumer surplus resulting from a high tariff, and CS^{**} is that resulting from a low tariff. The prize for each of the domestic firms is a group-specific public-good— that is, if domestic firm i wins its prize, then all the domestic firms enjoy being candidates for the prize. The domestic firms have the same valuation for their prize, and the same may be said of the foreign firms.

Next, consider the second stage. The inverse demand function of domestic market is given by $p(Q) = a - bQ$. Let q_{di} and q_{fj} denote the quantities produced by domestic firm i and foreign firm j , respectively. Then the aggregate quantity on the market is $Q = \sum_{i=1}^n q_{di} + \sum_{j=1}^m q_{fj}$. Assume that there are no fixed costs and the marginal cost is constant at c , where $c < a$.

Let π_{di} denote the payoff in the second stage for domestic firm i : $\pi_{di} = p(Q)q_{di} - cq_{di}$. And let π_{fj} represent the payoff in the second stage of foreign firm j when the foreign firms and consumer group win their prize: $\pi_{fj} = p(Q)q_{fj} - (c + t)q_{fj}$, where t is a (non-negative) low tariff. And if they lose, that of foreign firm j does not exist.

I assume that all the firms choose their output levels simultaneously and independently, and employ subgame-perfect Nash equilibrium as the solution concept.

III. EQUILIBRIA IN THE SECOND STAGE

After observing government's tariff policy in the first stage, firms choose their output levels to maximize their expected payoffs in the second stage. Concerning the expected payoffs of the second stage, I consider two cases.

3.1 The case when the domestic firms won in the first stage

In the case where the domestic firms won in the first stage, the foreign firms do not enter into the market. Let the aggregate quantity on the market be denoted Q_1 under the condition that the domestic firms won in the first stage:

$$Q_1 = \sum_{i=1}^n q_{di}$$

The optimal output of domestic firm i is obtained from the first-order and

the second-order conditions for maximizing its expected payoff: $\pi_{di} = p(Q) \cdot q_{di} - cq_{di}$. The optimal output of domestic firm i is then $q_{di}^* = (a - c)/b(n + 1)$, and the optimal expected payoff of domestic firm i is $\pi_{di}^* = (a - c)^2/b(n + 1)^2$. Since I assume that the domestic firms are homogeneous, n domestic firms' expected payoffs in the second stage are,

$$\pi_{d1}^* = \pi_{d2}^* = \dots = \pi_{dn}^* = \frac{(a - c)^2}{b(n + 1)^2}. \quad (6)$$

Next, I derive consumer surplus. If there are just the domestic firms, consumer surplus, CS^* , as consumer group be facing price $p = a + cn/n + 1$, is $[n^2(a - c)^2]/2b(n + 1)^2$.

3.2 The case when the foreign firms and consumer group won in the first stage

If the foreign firms and consumer group won their prizes, the foreign firms enter into domestic market, then the market has more suppliers. In that case, let us denote the aggregate quantity on the market by Q_2 : $Q_2 = \sum_{i=1}^n q_{di} + \sum_{j=1}^m q_{fj}$. It chooses q_{di} and q_{fj} to maximize the expected payoffs: $\pi_{di} = p(Q_2) \cdot q_{di} - cq_{di}$ and $\pi_{fj} = p(Q_2) \cdot q_{fj} - (c + t)q_{fj}$. By use of the first-order and the second-order conditions, I can derive the optimal output levels, $q_{di}^{**} = (a - c + mt)/b(m + n + 1)$ and $q_{fj}^{**} = (a - c - t - nt)/b(m + n + 1)$. As previously assumed that firms are homogeneous, n domestic firms and m foreign firms face the same expected payoffs in the second stage as follows,

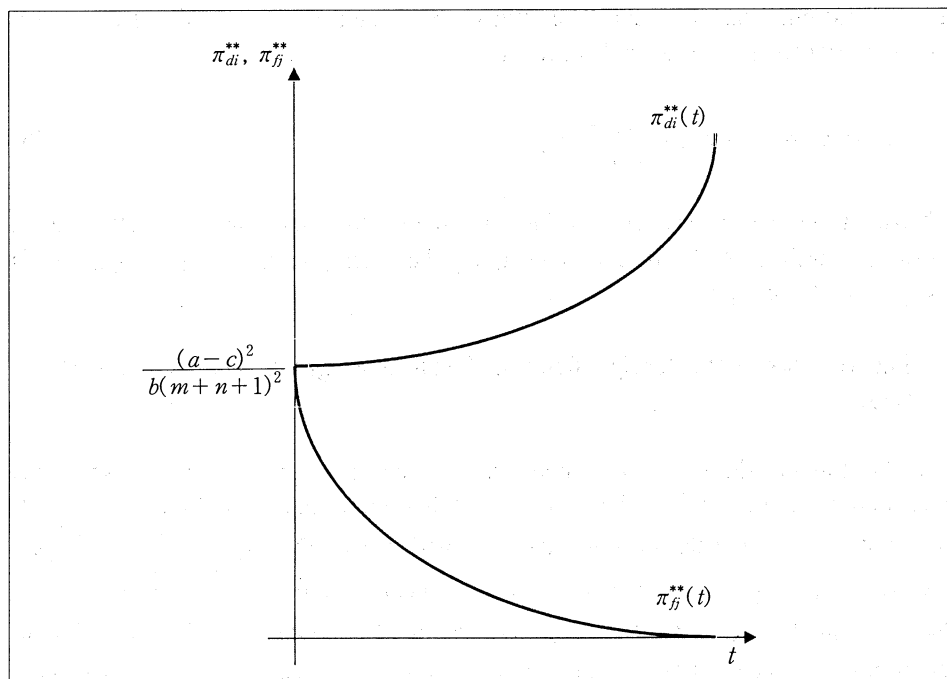
$$\begin{aligned} \pi_{d1}^{**} = \dots = \pi_{dn}^{**} &= \frac{(a - c + mt)^2}{b(m + n + 1)^2} \\ \text{and } \pi_{f1}^{**} = \dots = \pi_{fm}^{**} &= \frac{[a - c - (n + 1)t]^2}{b(m + n + 1)^2}. \end{aligned} \quad (7)$$

From payoffs (7), I can confirm the fact that the expected payoffs of firms in the second stage depend on the tariff level, t , and the number of firms, n and m .

It follows that as depicted in Figure 1, for tariffs, the expected payoffs of the domestic and the foreign firms are respectively strictly increasing and decreasing. In this case, if the expected payoffs of the foreign firms resulting from entry are nonpositive, they should make zero contribution; they don't participate in the contest. Therefore, the prize for the foreign firms is a tariff less than $(a - c)/(n + 1)$, and their expected payoffs have a maximum value with free trade, $\max \pi_{fj}^{**}(t) = \pi_{fj}^{**}(0)$. In the case of the domestic firms, the prize is a tariff more

than $(a-c)/(n+1)$, and their expected payoff, π_{di}^{**} , increase in the tariff.

[Figure 1] The expected payoffs in the second stage



In the case when domestic market opens, consumer surplus, CS^{**} , is greater than when not open. As the domestic price changes from $a+cn/n+1$ to $[a+c(n+m)+mt]/(m+n+1)$, CS^{**} is $[(a-c)m+(a-c)n-mt]^2/2b(m+n+1)^2$. And the difference between CS^* and CS^{**} becomes an incentive for consumer group to make a contribution.

IV. EQUILIBRIA IN THE FIRST STAGE

Now turn to the first stage of the game. The domestic firms lobby for the protection of domestic market, while the foreign firms and consumer group lobby for the opening.

Let Π_{di} denote domestic firm i 's expected payoff in the first stage. Domestic firm i chooses a contribution to maximize its expected payoff:

$$\begin{aligned} \max_{s_i} \Pi_{di} &= P(S, Y, x)(\pi_{di}^* - s_i) + (1 - P(S, Y, x))(\pi_{di}^{**} - s_i) \\ &= P(S, Y, x)\pi_{di}^* + (1 - P(S, Y, x))\pi_{di}^{**} - s_i. \end{aligned} \quad (8)$$

In the payoff function, $P(S, Y, x)$ is the probability that the domestic firms win the prize, and S is the sum of contributions of the domestic firms: $S = \sum_{i=1}^n s_i$. Therefore, the probability that domestic firm i wins the prize depends only on the sum of the domestic firms' contributions, not on its own contribution.

I first derive the reaction function of domestic firm i , which shows its best response to every possible contribution that the competitor might choose.

Given positive contributions of the foreign firms and consumer group, domestic firm i 's best response is obtained from the first-order condition for maximizing its expected payoff, domestic firm i 's expected payoff is strictly concave in its own contribution s_i and thus the second-order condition is satisfied.

Thus domestic firm i 's reaction function is then

$$s_i^*(Y, x) = \frac{1}{\beta} \sqrt{\beta(Y+x)(\pi_{di}^* - \pi_{di}^{**})} - \frac{1}{\beta}(Y+x), \quad (9)$$

where $s_i^*(Y, x)$ is domestic firm i 's best response to Y and x .

In this contest, the prize for each firm is a group-specific public-good — that is, if a domestic firm wins its prize, then all the domestic firms become a winner. Baik (1993) shows that if the prize of a game is a group-specific public-good, the player who has the highest valuation for the prize may participate in the game and the equilibrium contribution level of a player whose valuation of the prize is less than somebody else's in his group makes zero effect and thus he is a free rider. In this case, if $\pi_{d1}^* - \pi_{d1}^{**} > \pi_{dh}^* - \pi_{dh}^{**}$, for $h=2, \dots, n$, then domestic firm 1 makes a contribution and the rest of the domestic firms choose zero contributions, that is, $s_1^* = S$ and $s_2^* = \dots = s_n^* = 0$. That is, only the hungriest firm expends positive contribution. Baik (1993) demonstrates that given the other groups' equilibrium effort levels, $(\bar{X}^*)_{-i}$, group i 's equilibrium effort level is neither greater nor less than group i 's player-1-best response, $X_i(1)$.⁴ Thus, in this model, it can be expressed as $s_1^* = S = S(1)$. Now, consider a case in which all players have the same valuation. The sum of their contributions is S , and however in this case, the domestic firms' equilibrium contribution level is neither greater nor less than player-1-best response: $\sum_{i=1}^n s_i^* = S = S(1)$.

Next, consider foreign firm j 's expected payoff in the first stage. To induce the optimal contribution for foreign firm j , which maximizes its expected payoff in the first stage, I should derive the reaction function of foreign firm j ,

⁴ The player 1 makes effort to win the prize and the other players become free-riders.

$$\begin{aligned}\max_{y_j} \Pi_{fj} &= (1 - P(S, Y, x))(\pi_{fj}^{**} - y_j) + P(S, Y, x)(-y_j) \\ &= (1 - P(S, Y, x))\pi_{fj}^{**} - y_j.\end{aligned}\quad (10)$$

Foreign firm j 's reaction function shows its best response to every possible contribution that the domestic firms and consumer group might choose. Given their positive contributions, S and x , the best response of foreign firm j is obtained from the first-order condition for maximizing its expected payoff. Thus, foreign firm j 's reaction function is then

$$y_j^*(S, x) = \sqrt{\beta S \pi_{fj}^{**}} - \beta(S + x), \quad (11)$$

where $y_j^*(S, x)$ is foreign firm j 's best response to S and x . If foreign firm 1 values the prize most highly, he makes a contribution and the other firms expend zero contributions: $y_1^* = Y = Y(1)$. But if the foreign firms have the same valuation on the prize, they expend positive contributions: $\sum_{j=1}^m y_j^* = Y = Y(1)$.

Finally, consider consumer group's expected payoff in the first stage. Consumer surplus is CS^* with probability $P(S, Y, x)$, when the domestic firms won the prize, and CS^{**} with probability $(1 - P(S, Y, x))$, when the group itself or the foreign firms won the prize. Therefore, its expected payoff in the first stage is

$$\begin{aligned}\max_x \Pi_C &= P(S, Y, x)(CS^* - x) + (1 - P(S, Y, x))(CS^{**} - x) \\ &= P(S, Y, x)(CS^* - CS^{**}) + CS^{**} - x.\end{aligned}\quad (12)$$

Given positive contributions of the domestic and the foreign firms, consumer group's best response is obtained from the first-order condition for maximizing its expected payoff.

Consumer group's expected payoff is strictly concave in its own contribution x and thus the second-order condition is satisfied. Therefore, consumer group's reaction function is

$$x^*(S, Y) = \sqrt{\beta S (CS^{**} - CS^*)} - (\beta S + Y), \quad (13)$$

where $x^*(S, Y)$ is consumer group's best response to S and Y .

Proposition 1 of Baik (1993) implies that, to obtain the first-stage equilibrium contributions of the domestic and the foreign firms and contribution of consumer group, it would be considered a reduced game in which each one domestic and foreign firm and one consumer group compete to win their first-stage prize.

This observation is due to the fact that the prize is a group-specific public-good prize.

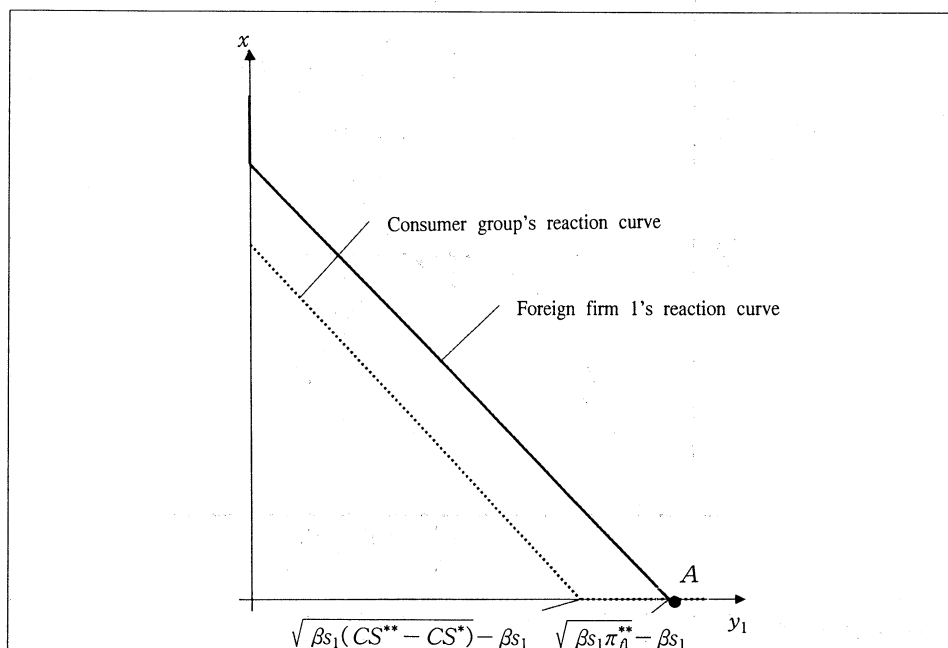
Hence, to obtain the first stage equilibrium contributions, I only need to solve a reduced game in which domestic firm 1, foreign firm 1, and one consumer group compete to win their prize. Thus, in the first stage, their expected payoff functions are given by

$$\begin{aligned}\Pi_d &= P(s_1, y_1, x) \frac{(a-c)^2}{4b} + (1 - P(s_1, y_1, x)) \frac{(a-c+t)^2}{9b} - s_1, \\ \Pi_f &= (1 - P(s_1, y_1, x)) \frac{(a-c-2t)^2}{9b} - y_1, \\ \text{and } \Pi_C &= P(s_1, y_1, x) \frac{(-7a+7c+2t)(a-c-2t)}{72b} + \frac{(2a-2c-t)^2}{18b} - x. \quad (14)\end{aligned}$$

I first derive the reaction function of domestic firm 1. The best response of domestic firm 1 is obtained from the first-order condition for maximizing its expected payoff. It is strictly concave in its own lobbying contribution and therefore the second-order condition is satisfied. Domestic firm 1's reaction function is then

$$s_1(y_1, x) = \frac{1}{\beta} \sqrt{\beta(y_1 + x) \frac{(5a-5c+2t)(a-c-2t)}{36b}} - \frac{1}{\beta(y_1 + x)}. \quad (15)$$

[Figure 2] Equilibrium given $\pi_A^{**} > CS^{**} - CS^*$



Next, I should derive the reaction functions of foreign firm 1 and consumer group. But by the characteristic of the public-good, only the one that has the highest valuation for the prize makes a lobbying contribution to win the prize. Olson (1965) refers to it as “*exploitation of the great by the small*”. It means that the less noticeable the firm the larger its incentive to free-ride.

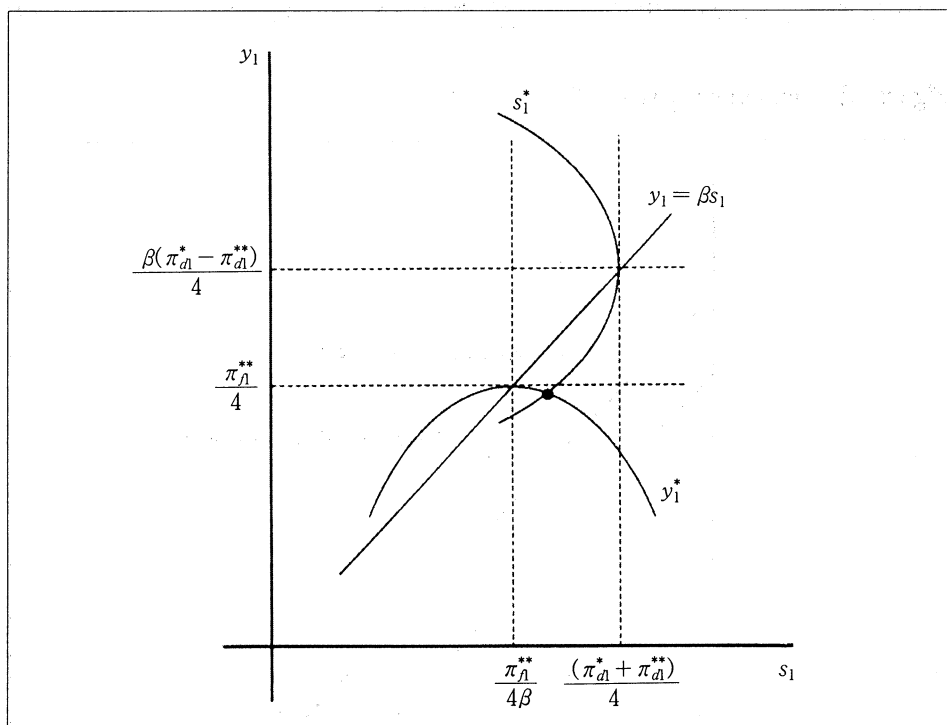
First, I consider that foreign firm 1's valuation is greater than consumer group's. As shown in Figure 2, if foreign firm 1 has a much larger valuation for the prize than consumer group, $\pi_{f1}^{**} > CS^{**} - CS^*$, its reaction curve may lie at every point outside that of consumer group. Therefore, the equilibrium is A, in which case, only foreign firm 1 makes a contribution, while consumer group is a free-rider.

Then, the reaction functions of the reduced game are

$$s_1(y_1) = \frac{1}{\beta} \sqrt{\frac{(5a-5c+2t)(a-c-2t)}{36b}} \beta y_1 - \frac{1}{\beta} y_1 \quad \text{for } y_1 > 0$$

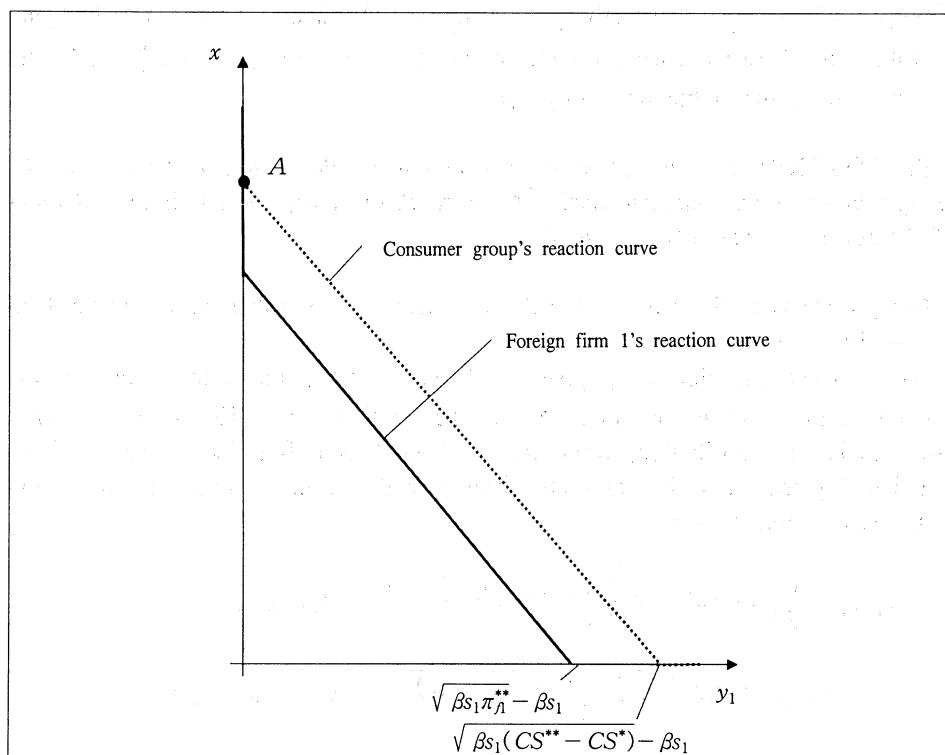
$$\text{and } y_1(s_1) = \sqrt{\frac{(a-c-2t)^2}{9b}} \beta s_1 - \beta s_1 \quad \text{for } s_1 > 0.$$

[Figure 3] Reaction curves of domestic firm 1 and foreign firm 1



Notes: $\pi_{d1}^* - \pi_{d1}^{**} \equiv \frac{(5a-5c+2t)(a-c-2t)}{36b}$, $\pi_{f1}^{**} \equiv \frac{(a-c-2t)^2}{9b}$

[Figure 4] Equilibrium given $\pi_{\lambda}^{**} > CS^{**} - CS^*$



Reaction curves of domestic firm 1 and foreign firm 1 are described in Figure 3. Since a Nash equilibrium occurs at an intersection of the reaction curves, the subgame-perfect Nash equilibrium of the reduced game is $E(s_1^*, y_1^*)$.⁵ So, in the case where foreign firm 1 makes a contribution, a unique subgame-perfect Nash equilibrium of the reduced game, (s_1^*, y_1^*) , is

$$(s_1^*, y_1^*) = \left(\frac{\beta(\pi_{d1}^* - \pi_{d1}^{**})^2(\pi_{\lambda}^{**})}{[\beta(\pi_{d1}^* - \pi_{d1}^{**}) + \pi_{\lambda}^{**}]^2}, \frac{\beta(\pi_{d1}^* - \pi_{d1}^{**})(\pi_{\lambda}^{**})^2}{[\beta(\pi_{d1}^* - \pi_{d1}^{**}) + \pi_{\lambda}^{**}]^2} \right).$$

Let S^* and Y^* be the total lobbying contribution of the domestic firms and the foreign firms in the subgame-perfect equilibria of the full game. Since they are equal to domestic firm 1's and foreign firm 1's contributions in the reduced game, I obtain that contributions of the domestic firms and that of the foreign firms in the subgame-perfect Nash equilibrium in the full game are

⁵ If β is less than 1, the intersection in Fig.3 is above the line $y_1 = \beta s_1$. And then it means that the probability in which the foreign firms win the contest is higher than that of the domestic firms (see Baik, 1994).

$S^* = [\beta(\pi_{d1}^* - \pi_{d1}^{**})^2 \pi_{d1}^{**}] / [\beta(\pi_{d1}^* - \pi_{d1}^{**}) + \pi_{d1}^{**}]^2$ and $Y^* = [\beta(\pi_{d1}^* - \pi_{d1}^{**})(\pi_{d1}^{**})^2] / [\beta(\pi_{d1}^* - \pi_{d1}^{**}) + \pi_{d1}^{**}]^2$, respectively. Therefore, I know that the lobbying contributions of firms depend on the valuation of the prize, $\pi_{d1}^* - \pi_{d1}^{**}$, π_{d1}^{**} , and the domestic firms' lobbying ability, β .

PROPOSITION 1. *The lobbying contribution of the domestic firms and the foreign firms in the subgame-perfect Nash equilibrium depend on firms' valuation of the prize and the lobbying ability.*

Next, I consider the case in which consumer group's valuation is greater than foreign firm 1's.

As depicted in Figure 4, given $\pi_{d1}^{**} < CS^{**} - CS^*$, the intersection of the reaction curves occurs at point A on the vertical axis. Therefore, consumer group makes a contribution, while foreign firm 1 is a free-rider. Hence, I have a reduced game in which domestic firm 1 and consumer group compete, and their reaction functions are

$$s_1(x) = \frac{1}{\beta} \sqrt{\frac{(5a-5c+2t)(a-c-2t)}{36b}} \beta x - \frac{1}{\beta} x \quad \text{for } x > 0$$

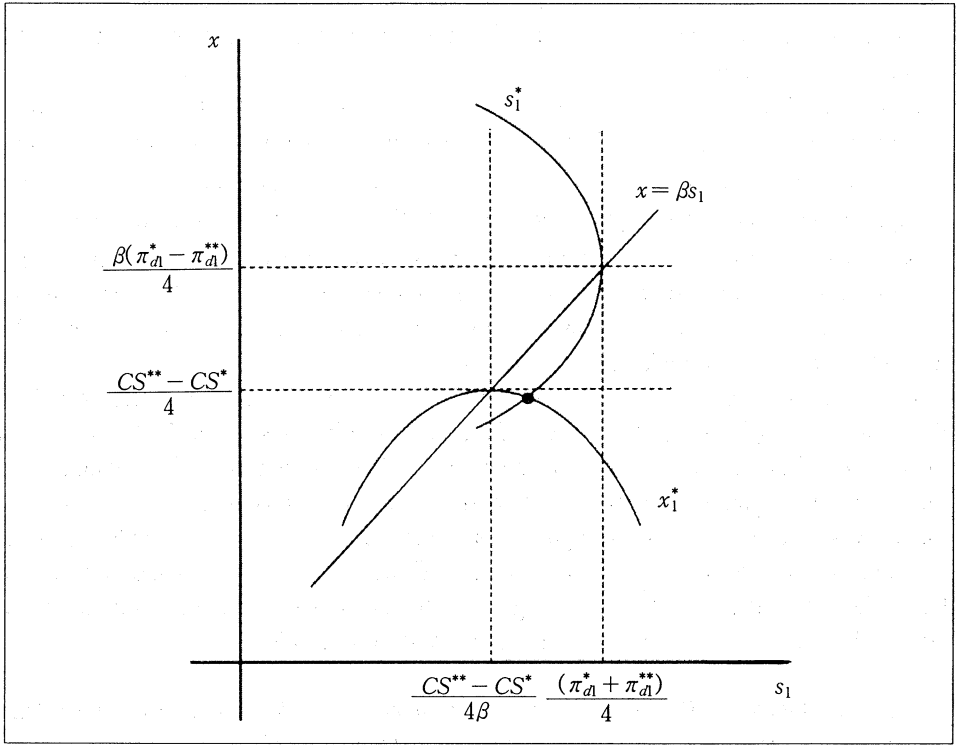
$$\text{and } x(s_1) = \sqrt{\frac{(-7a+7c+2t)(a-c-2t)}{72b}} \beta s_1 - \beta s_1 \quad \text{for } s_1 > 0.$$

Let $E(s_1^*, x^*)$ be an unique subgame-perfect Nash equilibrium of the reduced game. Then it satisfies the two reaction functions above. In the case where consumer group has the more valuation for the prize, the equilibrium lobbying contribution is

$$(s_1^*, x^*) = \left(\frac{\beta(\pi_{d1}^* - \pi_{d1}^{**})^2 (CS^{**} - CS^*)}{[\beta(\pi_{d1}^* - \pi_{d1}^{**}) + (CS^{**} - CS^*)]^2}, \frac{\beta(\pi_{d1}^* - \pi_{d1}^{**})(CS^{**} - CS^*)^2}{[\beta(\pi_{d1}^* - \pi_{d1}^{**}) + (CS^{**} - CS^*)]^2} \right).$$

And reaction curves of domestic firm 1 and consumer group are depicted in Figure 5. Let S^* and x^* be the total lobbying contribution of the domestic firms and that of consumer group in the subgame-perfect Nash equilibrium of the full game. Since they are equal to domestic firm 1's and consumer group's contributions of the reduced game, S^* and x^* are equal to $[\beta(\pi_{d1}^* - \pi_{d1}^{**})^2 (CS^{**} - CS^*)] / [\beta(\pi_{d1}^* - \pi_{d1}^{**}) + (CS^{**} - CS^*)]^2$ and $[\beta(\pi_{d1}^* - \pi_{d1}^{**})(CS^{**} - CS^*)^2] / [\beta(\pi_{d1}^* - \pi_{d1}^{**}) + (CS^{**} - CS^*)]^2$, respectively.

[Figure 5] Reaction curves of domestic firm 1 and consumer group



Notes: $CS^{**} - CS^* \equiv \frac{(-7a + 7c + 2t)(a - c - 2t)}{72b}$

V. ACTIVE CONSUMERS, TARIFF LEVELS, AND FREE-RIDERS

The existing papers on lobbying in the context of international trade consider that the domestic and the foreign firms compete with one another to win their prizes by making contributions. They do not consider consumers' decision except Helpman (1997). But consumers do not always allow government policy on trade. Rather, consumers try to defend their consumer surplus by making contributions. In the case where there are active consumers, I obtain interesting results.

Whether the foreign firms can earn positive profits by entering into domestic market or not depends on the tariff levels. In this model, by equation (11), I obtain that when the tariff level is $(a - c)/2$, profits of the foreign firms are equal to zero. Thus, the critical value of tariff is $(a - c)/2$. All levels above this critical value are consistent with the protection of the market, and all levels below the critical value imply the opening. That is, the prize for the foreign firms and consumer group is that the tariff level is set less than $(a - c)/2$. Note that their prize is a group-specific public-good. This fact makes possible

that, if they have a different valuation on the prize, one of them is free riding on the other. That is, one who has the highest valuation on the prize makes a contribution. From the Section III, I know that this valuation of the prize depends on the tariff levels.

If the tariff is between $(a-c)/14$ and $(a-c)/2$, consumer group has more valuation, $CS^{**} - CS^{*} > \pi_{ff}^{**}$. Thus, consumer group makes a contribution, while the foreign firms become free-riders. If the tariff is less than $(a-c)/14$, the foreign firms have more valuation, $\pi_{ff}^{**} > CS^{**} - CS^{*}$. Then, the foreign firms make contributions, while consumer group is a free-rider. If the foreign firms and consumer group expect the tariff to be higher than $(a-c)/2$, then none of the foreign firms and consumer group will make a contribution, and the domestic firms won't make a contribution.

It is due to active consumers that the foreign firms can be a free-rider. If there are no consumers, the foreign firms necessarily make contributions to win their prize. But, as my model, if there are active consumers, even though it is the international trade contest, the domestic firms and consumers compete among themselves, except for the foreign firms. That is, in the case of trade contests, if there are active consumers, the foreign firms, one of the competitive firms, have the advantage in the lobbying contribution toward the decision of trade policy. Extremely, they will be able to become a free-rider.

PROPOSITION 2. *If there are active consumers, the foreign firms rather than the domestic firms can have the advantage in trade contests.*

PROPOSITION 3. *If there is an active consumer group and the prize is a group-specific public-good, which one of the foreign firms and consumer group can be a free-rider, and whether who becomes a free-rider depends on the expected tariff levels.*

Proposition 3 can be interpreted that if there are active consumers, the foreign firms can achieve their object without effort, as the proverb goes "One man sows and another man reaps."

As mentioned by Damania & Fredriksson (2000), the formation of a lobby group may not be feasible because each firm has an incentive to free-ride on its rival's lobbying contribution. Therefore I can consider collusion that influence the ability to overcome free-rider problems in the formation of political lobby groups.

VI. CONCLUSIONS

I have considered a rent-seeking contest in which players compete to win their prizes, focusing on lobbying contributions made by the players.

The contest is a two-stage game in which the domestic firms, the foreign firms, and consumer group first compete to win their prize, the high tariff for the domestic firms and the low tariff for the foreign firms and consumer group, and then after knowing government's policy on the tariff, the domestic firms and the foreign firms choose their output to maximize the expected payoff.

I have found the following. First, the first-stage contributions of the domestic firms and those of the foreign firms in the subgame-perfected Nash equilibrium depend on firms' valuation of their own prize, and the lobbying ability, β . Second, if there are active consumers in trade contests, the foreign firms, one of the two competitive groups, have the advantage in the lobbying contribution toward the decision of trade policy. Third, if there is an active consumer group and the prize is a group-specific public-good, which one of the foreign firms and consumer group can be a free-rider, and whether who becomes a free-rider depends on the expected tariff levels. Such like this, because each firm has an incentive to free-ride on its rival's lobbying contribution, I can consider collusion that influence the ability to overcome free-rider problems in the formation of political lobby groups. This is an interesting subject. I leave that for future research.

REFERENCES

- Baik, Kyung Hwan (1993), "Effort levels in contests: The public-good prize case," *Economics Letters*, 41, pp.363--367.
- _____. (1994), "Effort Levels in Contests with Two Asymmetric Players," *Southern Economic Journal*, October, 61(2), pp.367--378.
- _____. (1999), "Rent-Seeking Firms, Consumer-surplus--defending Consumer Groups, and the Social Costs of Monopoly," *Economic Inquiry*, 37(3), July, pp.542--554.
- Baik, K.H. and Shogren, J. F. (1995), "Competitive-Share Group Formation in Rent-Seeking Contests," *Public Choice*, 83(1-2), pp.113--126.
- Coate, Stephen and Morris, Stephen (1999), "Policy Persistence," *American Economic Review*, 89(5), December, pp.1327--1336.
- Damania, Richard and Fredriksson, Per G. (2000), "On the formation of industry lobby groups," *Journal of Economic Behavior & Organization*, 41, pp.315-335.
- Gawande, Kishore, et al. (2004), "Foreign Lobbies and US Trade Policy," NBER Working paper 10205, January.
- Grossman, Gene M. and Helpman, Elhanan (1994), "Protection for Sale," *American Economic Review*, 84(4), September, pp.833--850.
- _____. (1995a), "The Politics of Free-Trade Agreements," *American Economic Review*, 85(4), September, pp.667--690.
- _____. (1995b), "Trade wars and Trade Talks," *Journal of Political Economy*, 103(4), pp.675--708.
- Helpman, Elhanan (1997), "Politics and trade policy," In Kreps, M. David and Kenneth F. Wallis (ed.) *Advances in Economics and Econometrics: theory and application*, Seventh World Congress Volume I, Cambridge University Press.
- Hillman, Arye L. and Ursprung, Heinrich W. (1988), "Domestic Politics, Foreign Interests, and International Trade Policy," *American Economic Review*, 78(4), September, pp.729--745.
- Lee, S. (1995), "Endogenous Sharing Rules in Collective-Group Rent-Seeking," *Public Choice*, 85, pp.31-44.
- Levy, Philip I. (1999), "Lobbying and international cooperation in tariff setting," *Journal of International Economics*, 47, pp.345--370.
- Long, Ngo Van and Soubeyran, Antoine (1996), "Lobbying for protection by heterogeneous firms," *European Journal of Political Economy*, 12, pp.19--32.
- McAfee, R. and McMillan, John (1989), "Government procurement and international trade," *Journal of International Economics*, 26, pp.291-308.
- Michaelis, Peter (1994), "Regulate Us, Please! On Strategic Lobbying in Cournot-Nash Oligopoly," *Journal of Institutional and Theoretical Economics*, 150(4), December, pp.693--709.

- Moore, Michael O. and Suranovic, Steven M. (1993), "Lobbying and Cournot-Nash Competition: Implications for Strategic Trade Policy," *Journal of International Economics*, 35, pp.367--376.
- Mitra, Devashish (1999), "Endogenous Lobby Formation and Endogenous Protection: A Long-Run Model of Trade Policy Determination," *American Economic Review*, 89(5), December, pp.1116--1134.
- Olson, Mancur (1965), *The logic of collective action: public goods and the theory of groups*, Cambridge, MA: Harvard University Press.
- Pecorino, Paul (1998), "Is There a Free-Rider Problem in Lobbying? Endogenous Tariffs, Trigger Strategies, and the Number of Firms," *American Economic Review*, 88(3) June, pp.652--660.
- Tullock, G. (1980), *Efficient Rent Seeking*, in *Toward a Theory of the Rent-Seeking Society* College Station, TX: Texas A&M University Press.
- Ursprung, H.W. (1990), "Public Goods, Rent Dissipation, and Candidate Competition," *Economics and Politics*, 2(2), pp.115--132.
- Wellisz, Stanislaw and Wilson, John D. (1986), "Lobbying and Tariff Formation: A Deadweight Loss Consideration," *Journal of International Economics*, 20, pp.367--375.