

# The Number of Firms and the Politics of Export Subsidy

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# The Number of Firms and the Politics of Export Subsidy

## **Abstract**

The purpose of this paper is to present a framework to understand that the government's implementation of export subsidy is influenced by the political pressure from the home firms which can bear the costs of forming and maintaining a lobby in order to overcome a free-rider problem associated with lobbying. When the number of the foreign firms is large in comparison with that of the home firms, the home firms can organize a lobby group more easily and lobby for higher export subsidy. The implementation of politically optimal export subsidy can make the domestic social welfare far worse than when the free trade is maintained by a multilateral agreement which prohibit export subsidies.

keywords: lobby formation, political contribution, export subsidy, multilateral agreements

# 1 Introduction

In a Cournot duopoly setting, where one domestic firm and one foreign firm compete in a third market, Brander and Spencer(1985) show that a government export subsidy may increase its national welfare by shifting sufficient rents from the foreign firm. This argument for profit-shifting export subsidy, which was different from conventional wisdom, has generated a lot of subsequent work which have shown that free trade may not maximize national welfare in a world with oligopolistic industries. However many economists will not necessarily approve to implement such export subsidy and give a number of caution about it<sup>1</sup> .

From a viewpoint of political economy , in particular, there are two concerns in the caution; retaliation and lobbying<sup>2</sup> . The export subsidy aimed at shifting sufficient rents from foreign firms is believed to increase national welfare at the expense of other countries. Hence a country which attempts to such policy will provoke retaliation and cause tariff war. The result of tariff war will usually be a prisoners' dilemma where both countries are worse off than under free trade<sup>3</sup> . The way to avoid getting trapped into such a prisoners' dilemma is to establish agreements between exporting countries to prohibit export subsidies. Nowadays, Article 3.1(a) of the Uruguay Round Agreement on Subsidies and Countervailing Measures, which came into force in January 1995, prohibits all members of the World Trade Organization, except the least developed countries, from subsidizing exports of industrial products. The threat of a tariff war can provide a political economic rationale for this WTO rule from the aspect of international relations<sup>4</sup> .

Also, the government's enforcement of export subsidy is likely to be influenced by interest groups' lobbying. In the real world, a government does not necessarily aim at maximizing social welfare but at winning elections. The government concerned with winning elections can not ignore political pressure from interest groups because the government needs their political supports. Hence, it may happen that the government implements too much export subsidy or chooses unsuitable industries as targets of export subsidy. Considering such points, Krugman(1987) argues that maintaining a free trade is the best policy which the government can take actually because the government is unable to escape from their political pressure. When the political pressure on implementation of export subsidy is taken into consideration,

it can also be justified to restrain the action of the government by means of multilateral agreements that prohibit export subsidy in the light of internal politics. However there have been few studies that analyze the influence of lobbying on the government export subsidy, while there have been many studies of political economy of international trade policy<sup>5</sup>.

Moore and Suranovic(1993), following the approach used by Findlay and Wellisz (1982), incorporate the home firm's lobbying for higher export subsidy into the basic model of Brander and Spencer(1985) and analyze what influence such lobbying has on social welfare. It is shown that enforcement of an export subsidy may decrease the social welfare of its own country and so the country can be worse off than under free trade when the firm's lobbying is socially wasteful enough. However, it does not investigate in detail the conditions where the home firm's lobbying for higher export subsidy can make the domestic social welfare worse than under free trade. Also, it does not analyze in detail the export subsidy level determined politically and home firms' lobbying.

The purpose of this paper is to analyze in detail the influence of the political activity by the home firms in the same industry on the government export subsidy, and is to deepen our understanding about it. In this paper, following the approach used by Grossman and Helpman (1994), we will focus on the situation where home firms in the same industry jointly offer the political contribution to an incumbent government in order to induce it to provide more export subsidy. We also examine the export subsidy level which the government politically chooses, and the joint political donation which is paid to the government by home firms. Moreover, we analyze the effect of the politically determined export subsidy on the domestic social welfare and consider when the implementation of politically determined export subsidy can make the domestic social welfare far worse than under free trade.

Furthermore, Moore and Suranovic(1993) do not considers the formation of a lobby because they analyze the situation where a home firm lobby for a higher export subsidy and thus a free-rider problem does not come about. Just as Moore and Suranovic(1993), in the political economy of trade policy literature, many studies has so far been done under the assumption that interest groups lobbying for trade policy already exist. However, anyone who has the common interest over trade policy cannot

necessarily organize a lobby. It is because that a free-rider problem is associated with lobbying for trade policy since the lobbying has public-good characteristic: while those who do not bear the costs of lobbying for trade policy could enjoy the return from it, people who bear the costs can not prevent them from doing such acts. In order to lobby effectively, it is necessary to solve the free-rider problem<sup>6</sup>.

In this paper, we investigate the effect of the number of foreign firms on the home firms' lobby formation. In recent years, some works model how a lobby is endogenously formed in the political process to solve the free-rider problem. There are two approaches about endogenous formation of a lobby in the political economy of trade policy literature. The first approach analyze whether the free rider problem is solved by the use of a trigger strategy in an infinitely repeated game setting (e.g. Pecorino(1998), Damania and Fredriksson(2000), and Magee(2002)). The second approach introduces the organizational costs of lobby for solving the free-rider problem into the model (e.g. Mitra(1999)). This paper's approach is the same as the latter; we assume that the home firms must pay the costs to form and maintain a lobby in order to overcome the free-rider problem and offer their joint political donation to the government for higher export subsidy.

This paper is organized as follows. We develop the model in Section 2. Section 2.1 sets out the assumptions of the model used throughout this paper and Section 2.2 derives the subgame perfect equilibrium outcome. In this Section, we take up two points: (i)how the home firms which can form the organized lobby jointly offer political contribution to the government for higher export subsidy; and (ii)how the government selects export subsidy in order to maximize her chance of re-election as a result of the political donation from the home firms.

In Section 3, we consider the effects of the change of the number of home firms and that of foreign firms on the politically determined export subsidy level. When the home firms can organize a lobby and give political contribution to the incumbent government, the government selects the politically optimal export subsidy which is higher than the welfare-maximizing export subsidy for its own country. An increase in the number of home firms makes the politically optimal export subsidy lower. When the number of foreign firms increase, the government selects higher export subsidy. Moreover, we examine the effects of

the change of the number of home firms and that of foreign firms on the political contribution level which the home firms give to the government. An increase in the number of home firms makes the amount of their joint campaign contribution smaller. When the number of foreign firms becomes larger, the amount of their joint campaign contribution becomes higher. We note that the effect of the number of home and foreign firms on their joint campaign contribution corresponds to that on the politically optimal export subsidy level.

In Section 4, we investigate the influence of the change of the number of foreign firms on the home firms' lobby formation. When the home firms must bear the cost of organizing a lobby in order to solve the free-rider problem and give their political donation to the government for higher export subsidy, an increase in the number of foreign firms makes it easier for the home firms to organize a lobby. We note that whether or not the home firms can form and maintain a lobby depends on the ratio of the number of home firms to that of foreign firms.

In Section 5, we finally examine the effect of the implementation of the politically optimal export subsidy on the domestic social welfare. We investigate when the implementation of politically optimal export subsidy can make the domestic social welfare far worse than under the free trade which is maintained by multilateral agreements which prohibit export subsidies. We find that under either of the following conditions the government's implementation of politically optimal export subsidy is likely to make the domestic social welfare far worse than when the free trade is maintained: (i)the number of home firms is much smaller than that of foreign firms; (ii)the number of home firms is almost the same as that of foreign firms; or (iii)the large portion of organizational costs of lobby is wasted socially. Under these conditions, from a political economy viewpoint, it is desirable to impose restrictions on the government's implementation of export subsidy by the multilateral agreements. Section 6 states the concluding remarks.

## 2 The model

### 2.1 Assumptions

Let us consider a Cournot competition in a third-market. There are  $n$  firms in the home country and  $m$  firms in the foreign country, producing a homogeneous good and exporting to the third-market. We assume that there is no consumption in the producing countries, and there is neither entry nor exit, no transportation costs and no trade barriers. Each firm in each country competes for quantities with Cournot conjecture in the third country. We assume that these firms have identical technology and a constant marginal cost,  $c$ , is required to produce one unit of the commodity. The domestic government gives the home firms an export subsidy,  $s > 0$ , per unit exported. The foreign government does not give an export subsidy to the foreign firms. We adopt linear inverse demand function;  $P = a - b(\sum_{i=1}^n q_i + \sum_{j=1}^m q_j^*)$ , where  $a > 0$  and  $b > 0$  are parameters.  $P$  stands for the product price in the third country.  $q_i$  and  $q_j^*$  are the output of the representative home and foreign firm, respectively. The home and foreign firms are assumed to maximize profits,

$$\pi_i = (P - c + s)q_i , \quad (1)$$

$$\pi_j^* = (P - c)q_j^* . \quad (2)$$

Let us turn to the political market for export subsidy. In this paper, following the approach used by Grossman and Helpman (1994), we will focus on the situation where the risk-neutral home firms in the same industry can coordinate campaign contribution and make a collective contribution to the government in the hope that it will increase export subsidies to them<sup>7</sup>. The joint campaign contribution from the home firms is denoted by  $C_J$ . The foreign firm and home firms is assumed not to lobby in the home country and foreign country, respectively<sup>8</sup>.

Note that a free-rider problem can be associated with the home firms' political contribution activity. Therefore, the home firms are required to form and maintain a lobby. We assume that the home firms must organize a lobby and bear some costs of organizing it. The organizational costs consist of two kinds: variable costs (e.g. a monitoring cost and a cost of building a communications network among members)

and fixed costs (e.g. a cost of forming an organization, establishing links with politicians and a cost of hiring professional lobbyists)<sup>9</sup>.

The costs of forming and maintaining it are assumed to be

$$F = \lambda(n - 1)^2 + f, \quad (3)$$

where  $\lambda$  is an efficiency parameter. The first term on the right hand side of Eq.(3) represents the variable costs of forming and maintaining it and the second term its fixed costs. This function has two desirable properties<sup>10</sup>. First, it equals  $f$  when  $n$  equals 1, so that the firm bears only the fixed costs. Second, it rises rapidly as  $n$  increases, which reflects the widely accepted belief that the difficulty of forming and maintaining the lobby raises rapidly as the number of firms increases. Since there are two or more firms in the home county, each home firm is assumed to bear the “ $n$ ” th part of the organizational costs. Each home firm has an incentive to enjoy a free ride on the other home firms’ political contribution activity, when  $\frac{C_J+f}{n-1} \geq \Delta\pi$  is satisfied<sup>11</sup>. In the rest of the paper, this condition holds as long as  $n$ -home firms influence the government export subsidy through lobbying activity.

In the setting here, the incumbent government is to seek to maximize its probability of re-election. The government will care about the average voters’ wellbeing and the political donation received from the home firms because winning an election depends on public endorsement and funds for campaign. Note, however, that the assumption that a government needs political contribution for campaign is implicitly based upon the assumption that most voters are uninformed<sup>12</sup>. The government’s objective function is taken to be a weighted sum of political contributions and aggregate social welfare,<sup>13</sup>

$$G = C_J + \gamma W(s). \quad (4)$$

where  $W(s)$  is aggregate social welfare of home country, which is given by

$$W(s) = \sum_{i=1}^n \pi_i - s \sum_{i=1}^n q_i. \quad (5)$$

$C_J$  is the joint campaign contribution from the home firms and  $\gamma$  is the weight that the government places on aggregate social welfare relative to the campaign contribution.



The model is constructed as a four-stage game. In the first stage, the home firms decide whether to contribute the money to finance forming and maintaining a lobby. In the second stage, if the home firms can organize the lobby, they offer the incumbent government a contingent campaign contribution schedule,  $C_J(t)$ . The contribution schedule maps an export subsidy level,  $s$ , in the government's one-dimensional choice set,  $\mathbf{S}$ , into a campaign contribution level;  $(C_J : \mathbf{S} \rightarrow \mathbf{R}_+)$ . The contribution schedule is assumed to be differentiable. In the third stage, the government selects an export subsidy level, taking the contribution schedule as given. At the same time, the incumbent government receives from the home firms the amount of contribution associated with the export subsidy. In the last stage, the home firms and the foreign firms choose the level of their output simultaneously and export the good to a third country, taking the export subsidy as given.

## 2.2 A model of endogenous lobby and trade policy formation

In this section, we derive the subgame perfect equilibrium by means of backward induction. In the last stage, the home and foreign firms decide their output and export the good to the third country, taking the export subsidy as given. Assuming that the home and foreign firms produce in positive quantities, the first order conditions for a Cournot competition are

$$\frac{d\pi_i}{dq_i} = a - bQ - c + s - bq_i = 0, \quad \frac{d\pi_j^*}{dq_j^*} = a - bQ - c - bq_j^* = 0.$$

These first order conditions can be solved to yield the output level,

$$q_i = \frac{a - c + (m + 1)s}{(m + n + 1)b}, \quad q_j^* = \frac{a - c - ns}{(m + n + 1)b}. \quad (6)$$

Since the home firms and the foreign firms are, respectively, symmetric, we will represent  $q_i$  as  $q$  and  $q_j^*$  as  $q^*$ . The profit of the home firms and the foreign firms are

$$\pi_i = bq^2, \quad \pi_j^* = bq^{*2}. \quad (7)$$

Thus, the aggregate social welfare for home country is given by

$$W(s) = n \left[ \frac{(a - c + (m + 1)s)(a - c - ns)}{(m + n + 1)^2 b} \right]. \quad (8)$$

Let us consider the trade policy formation process<sup>14</sup>. We can regard the home firms as a principal, and the incumbent government as an agent in the policy-making process<sup>15</sup>. We will consider what contribution schedule the home firms should collectively offer to the government, using Figure.1.

A curve  $G_0G_0$  depicts the combinations of the export subsidy level,  $s$ , which the government selects (on the horizontal axis) and the joint campaign contribution,  $C_J$ , from the home firms (on the vertical axis), which satisfy  $\gamma W(s^o) \equiv C_J + \gamma W(s)$ .  $s^o$  is the optimal export subsidy for the government in absence of any campaign contribution from them. Note that  $s^o$  is the social-welfare-maximizing export subsidy because it derives from maximization of  $\gamma W(s)$ .  $s^a$  means the export subsidy level which induces the foreign firms to export nothing to the third country. The curve  $G_0G_0$  is, in other words, the incumbent government's indifference curve representing the highest utility level which the government can attain in absence of any campaign contribution. When the government selects an export subsidy different from  $s^o$ , the government needs to attain contributions to maintain the same utility level as  $\gamma W(s^o)$ . Since the government's objective function is a concave function of  $s$  for a given value of  $C_J$ , the government's indifference curve,  $G_0G_0$ , has the shape shown in Figure 1. So, the upper indifference curve for the government represents the higher government's utility level.

A curve  $J_0J_0$  depicts the combinations of the export subsidy level selected by the government and the joint campaign contribution from the home firms, which satisfy  $\sum_{i=1}^n \pi_i(s^o) \equiv \sum_{i=1}^n \pi_i(s) - C_J$ . The curve  $J_0J_0$  is, in other words, the indifference curve for the home firms, representing the highest joint profit which the home firms can gain when they do not offer any campaign contribution. Since the joint profit for the home firms is an increasing function of  $s$ , the higher export subsidy the government selects, the more joint campaign contribution the home firms must offer to the government in order to maintain the same aggregate profit level as  $\sum_{i=1}^n \pi_i(s^o)$ . The indifference curve for the home firms,  $J_0J_0$ , has the shape in Figure 1. So, the lower indifference curve for the home firms represents the higher joint profit level.

The home firms set their joint contribution schedule, taking account of the incumbent government's indifference curve. The point  $A : (s^{P*}, C_J^*)$  yields the highest joint profit to the home firms among those

that leave the government the same utility level as the government can attain with no contributing from the home firms. The home firms must collectively contribute a tiny bit more  $C_J^*$  to induce the government to choose  $s^{p^*}$ . However, when the home firms contribute the same amount of  $C_J^*$ , the government will feel no reluctance to choose  $s^{p^*}$  because she can derive exactly the same utility as she would attain without any campaign contribution from the home firms. It is most desirable for the home firms to collectively contribute the same amount of  $C_J^*$ . That is, they exactly compensate the government for the welfare loss which arises from changing  $s^o$  into  $s^{p^*}$ . Therefore the home firms jointly offer the contribution schedule  $C_J(s)$  which is tangent to  $G_0G_0$  at the point  $A$ . We can see that if the home firms jointly offer this contribution schedule in the first stage, the incumbent government will choose  $s^{p^*}$  at the point  $A$  in the second stage. Notice that in the neighborhood of the equilibrium, the derivative of joint profit function for the home firms with respect to the export subsidy is equal to that of their joint campaign contribution schedule with respect to the export subsidy<sup>16</sup>.

In the third stage, the incumbent government chooses the export subsidy level to maximize  $G$ , taking the contribution schedule as given. The government's maximization of  $G$  yields the following first order condition;

$$\frac{\partial C_J}{\partial s} + \gamma \frac{\partial W(s)}{\partial s} = 0 .$$

Using the property of the joint campaign contribution schedule around the equilibrium;  $\sum_{i=1}^n \frac{\partial \pi_i}{\partial s} = \frac{\partial C_J}{\partial s}$ , the government's first order condition can be rewritten as

$$\sum_{i=1}^n \frac{\partial \pi_i}{\partial s} + \gamma \frac{\partial W(s)}{\partial s} = 0 . \quad (9)$$

At the political equilibrium, the incumbent government acts as if it maximized a weighted sum of the home firms' joint profits and aggregate social welfare.

Solving Eq.(9) for  $s$  yields the politically optimal export subsidy,

$$s^p = \frac{(2(m+1) + \gamma(m+1-n))(a-c)}{2(m+1)(\gamma n - m - 1)} . \quad (10)$$

When the second order condition is satisfied, the denominator is positive. In Figure 1, this is represented as  $s^{p^*}$ . At this time, in the fourth stage of the game the home firms will give the incumbent government

the following amount of political contribution;

$$C_J = \gamma[W(s^o) - W(s^p)] . \quad (11)$$

The home firms jointly contribute an amount that is proportional to the excess burden which the equilibrium export subsidy impose on the society. This is represented as  $C_J^*$  in Figure 1.

If the home firms can not organize the lobby and offer any campaign contribution, the government selects the following export subsidy;

$$s^o = \frac{(m+1-n)(a-c)}{2n(m+1)} . \quad (12)$$

$s^o$  is also the social-welfare-maximizing tariff, which the benevolent government would select.

The export subsidy level which induces the foreign firms to export nothing to the third country is given by

$$s^a = \frac{(a-c)}{n} . \quad (13)$$

We note that the highest possible equilibrium export subsidy is  $s^a$ . Since further increases in export subsidy at  $s^a$  do not lead to any greater gains for the home firms, they do not have any incentive to contribute money to the government in order to obtain a higher export subsidy than  $s^a$ . When  $\sum_{i=1}^n \frac{\partial \pi_i}{\partial s} \Big|_{s=s^a} > \frac{\partial G}{\partial s} \Big|_{s=s^a}$ , the home firms jointly offer the contribution schedule which is tangent to the government's utility function at  $s^a$  in the first stage and the incumbent government selects  $s^a$  in the second stage.

We now turn to the first stage of the game, where the home firms must decide whether to contribute the money to finance forming and maintaining the lobby in order to solve the free-rider problem. From the assumption that each home firm is symmetric and bears the "n"th part of the organizational costs, the home firms can organize the lobby if the following condition is satisfied;

$$\begin{aligned} V &= n[\pi(s^p) - \pi(s^o)] - C_J - F \\ &= nb[q(s^p)^2 - q(s^o)^2] - \gamma[W(s^o) - W(s^p)] - \lambda(n-1)^2 - f \geq 0 . \end{aligned} \quad (14)$$

If the incremental benefit from their joint political donation is larger than the sum of the political donation

and the organizational cost, the home firms have an incentive to form and maintain the lobby for political activity.

### 3 Equilibrium Export Subsidy

In this section, we analyze the equilibrium export subsidy level. We will investigate the effect of a change in the number of home firms or that of foreign firms on the equilibrium export subsidy level.

Using Eq.(12) and Eq.(13), the difference between  $s^p$  and  $s^o$  is

$$s^p - s^o = \frac{(n(m+1) + m(m+2))(a-c)}{2n(m+1)(\gamma n - m - 1)} > 0 .$$

$s^p$  is larger than  $s^o$  as a result of lobbying by the home firms. In Figure 2, we demonstrate the export subsidy level of  $s^p$ ,  $s^o$  and  $s^a$  for varying the number of home firms on the horizontal axis ( $2 \leq n \leq 10$ ), when, for example,  $a = 200$ ,  $b = 1$ ,  $c = 5$ ,  $m = 10$  and  $\gamma = 12$ . From the figure, we can confirm that the government does not necessarily choose the welfare-maximizing export subsidy for its own country as a result of the political pressure from the home firms, which can organize the lobby.

Differentiating  $s^p$  with respect to  $n$ , we obtain

$$\frac{\partial s^p}{\partial n} = -\frac{\gamma(a-c)}{2(m+1)[(\gamma n - m - 1)]^2} [(\gamma n - m - 1) + 2(m+1) + \gamma(m+1-n)] < 0 ,$$

when  $n \leq m + 1^{17}$ . At this time, as seen in Figure 2,  $s^p$  becomes smaller as  $n$  increases. From Eq.(9), the effect of a change in the variable on the equilibrium export subsidy level consists of two parts; the effect of a change in the variable on the derivative of the home firms' joint profit with respect to the export subsidy,  $\sum_{i=1}^n \frac{\partial \pi_i}{\partial s} \Big|_{s=s^p}$ ; and the effect of a change in the variable on the derivative of the weighted aggregate social welfare with respect to the export subsidy,  $\gamma \frac{\partial W(s)}{\partial s} \Big|_{s=s^p}$ . An increase in  $n$  makes  $\sum_{i=1}^n \frac{\partial \pi_i}{\partial s} \Big|_{s=s^p}$  and  $\gamma \frac{\partial W(s)}{\partial s} \Big|_{s=s^p}$  smaller when the number of foreign firms is given constant. Thus the government must select smaller export subsidy to satisfy Eq.(9). It is for this reason that an increase in the number of the home firms makes the terms of trade loss by the export subsidy larger than the incremental profit-shifting gain by the export subsidy because an increase in export by the more home firms lower the price of the good in the third country.

Next, differentiating  $s^p$  with respect to  $m$ , we obtain

$$\frac{\partial s^p}{\partial m} = \frac{\gamma(a-c)}{2(m+1)(\gamma n - m - 1)^2} [\gamma(\gamma n - m - 1) + 2(m+1) + \gamma(m+1-n)] > 0 ,$$

when  $n \leq m+1$ <sup>18</sup>. An increase in  $m$  makes  $\sum_{i=1}^n \frac{\partial \pi_i}{\partial s} \Big|_{s=s^p}$  and  $\gamma \frac{\partial W(s)}{\partial s} \Big|_{s=s^p}$  larger when the number of home firms is given constant. Thus the government must choose larger export subsidy to satisfy Eq.(9). The reason is that an increase in the number of the foreign firms makes the profit-shifting gain larger than the terms of trade loss because an export subsidy can shift sufficient rents from the more foreign firms.

The following proposition summarizes the results of this section.

**Proposition 1** *Suppose that the home firms lobby for higher export subsidy, the government chooses the export subsidy which is higher than the welfare-maximizing one. When the number of home firms increases, the government selects lower export subsidy at an equilibrium. When the number of foreign firms increases, the government selects higher export subsidy at an equilibrium.*

## 4 Political Contribution

In this section, we will consider the effect of a change in the number of home firms or that of foreign firms on the amount of the joint political contribution which the home firms give to the government.

The amount of the joint political contribution from the home firms is represented as Eq.(11). From Eq.(11), we can consider that the amount of the joint political contribution becomes larger when the gap between  $s^p$  and  $s^o$  becomes larger. This is because the welfare loss arising from the implementation of the politically optimal export subsidy depends on the gap between  $s^p$  and  $s^o$ . Differentiating  $s^p - s^o$  with respect to  $n$ , we obtain

$$\frac{\partial (s^p - s^o)}{\partial n} = -\frac{\gamma m(m+2)(a-c)}{2(m+1)(\gamma n - m - 1)} < 0 .$$

When the number of the home firms increases, the difference between  $s^p$  and  $s^o$  becomes smaller (See Figure 2). Next, differentiating  $s^p - s^o$  with respect to  $m$ , we obtain

$$\frac{\partial (s^p - s^o)}{\partial m} = \frac{2n(a-c)[(\gamma n - m - 1)[m(m+1) + (m+2)] + (m+1)[n(m+1) + m(m+2)]}{[2n(m+1)(\gamma n - m - 1)]^2} > 0 ,$$

When the number of the foreign firms increases, the difference between  $s^p$  and  $s^o$  becomes larger.

**Proposition 2** *When the number of home firms increases, the amount of the joint political contribution from the home firms becomes smaller. In contrast, when the number of foreign firms increases, it becomes larger.*

It is worth noting that the effect of the number of home and foreign firms on their joint campaign contribution corresponds to that on the politically optimal export subsidy level (See Proposition 1). Due to the complexity of the solution referring to equilibrium joint political donation from the home firms, we will make use of numerical analysis. In Figure 3, we show the equilibrium level of  $C_J$  for varying the number of the home firms on the horizontal axis ( $2 \leq n \leq 10$ ), under the same numerical value as in Figure 2. From Figure 3, we can confirm that an increase in  $n$  makes the amount of the joint political contribution from home firms smaller when  $m$  is set constant. As is seen in Figure 3, an increase in  $m$  makes the amount of the joint political contribution from home firms larger when  $n$  is set constant.

## 5 The Number of Firms and Lobby Formation

Let us examine the effect of a change in the number of foreign firms on the formation of an organized lobby by the home firms. As has been noted above, a free-rider problem is associated with the home firms' political contribution activity and thus it is necessary for them to organize a lobby in order to overcome it and carry out political activity. Hence, the home firms must bear the costs of forming and maintaining the lobby. An increase in the number of the home firms makes the home firms' formation and maintaining of their lobby more difficult and gets the costs of organizing lobby to be larger. Therefore, if the number of the home firms is very large, the home firms can not organize the lobby. Then, does an increase in the number of foreign firms make the home firms' lobby formation easier? In this section, we take up this question.

If Eq.(14) becomes positive, the home firms have an incentive to form and maintain the lobby for political activity. Since the solution referring to  $n[\pi(s^p) - \pi(s^o)] - C_J$  at the equilibrium is complicated, we shall make use of numerical analysis. In Figure 4, we depict the equilibrium level of  $n[\pi(s^p) - \pi(s^o)] - C_J$

and  $\lambda(n-1)^2 - f$  for varying the number of the home firms on the horizontal axis ( $2 \leq n \leq 10$ ), when, for example,  $a = 200$ ,  $b = 1$ ,  $c = 5$ ,  $m = 10$ ,  $\gamma = 12$ ,  $\lambda = 10$  and  $f = 4500$ . Under these numerical values, as seen in Figure 4, the home firms the number of which is 2 can bear the organizational costs, and can form and maintain the lobby. It can be understood that the larger the organizational costs becomes, the smaller the number of home firms which can organize the lobby.

When the number of foreign firms increases from 10 to 15 in this numerical analysis, as seen in Figure 4, the curve represented as  $n[\pi(s^p) - \pi(s^o)] - C_J$  shifts upward and the number of home firms which are able to organize the lobby becomes larger. This reason can be considered as follows. Differentiating  $q(s^p)$  and  $q(s^o)$  with respect to  $m$ , we can obtain

$$\frac{\partial q(s^p)}{\partial m} = \frac{\gamma(a-c)}{2b(\gamma n - m - 1)^2} > 0, \quad \frac{\partial q(s^o)}{\partial m} = 0.$$

Hence,  $\frac{\partial \pi(s^p)}{\partial m} - \frac{\partial \pi(s^o)}{\partial m}$  is positive: an increase in the number of foreign firms leads to the larger incremental benefit from their joint political donation. This is because an increase in the number of the foreign firms makes the profit-shifting gain larger than the terms of trade loss. On the other hand, an increase in  $m$  gets  $C_J$  larger (See Proposition 2). However, an increase in  $m$  makes  $n[\pi(s^p) - \pi(s^o)]$  more larger than  $C_J$  and thus  $n \left[ \frac{\partial \pi(s^p)}{\partial m} - \frac{\partial \pi(s^o)}{\partial m} \right] - \frac{\partial C_J}{\partial m}$  is positive. Therefore, when the number of the foreign firms is large in comparison with that of the home firms, the home firms can organize a lobby group more easily.

**Proposition 3** *In a Cournot oligopoly, whether or not the home firms can form and maintain a lobby depends on the ratio of the number of home firms to that of foreign firms.*

We note that whether the home firms can form and maintain a lobby depends not only on the number of home firms but also on that of foreign firms.

## 6 Prohibition of Export Subsidy and Domestic Welfare

In this section, we examine the effect of the implementation of the politically optimal export subsidy on the domestic social welfare under the assumption that the home firms organize a lobby and are engaged in political contribution activity for more export subsidies<sup>19</sup>. To figure out when its implementation makes



the domestic social welfare far worse than under free trade, we will take up two regimes: (i) the home firms use political donation to induce the government to fork out more subsidy to them; and (ii) the home firms are unable to lobby because the government must maintain free trade to respect a multilateral agreement which prohibit export subsidies. Is it desirable to impose restrictions on the government's implementation of export subsidy by a multilateral agreement which prohibit export subsidies?

When the government gives the industry an export subsidy,  $s$ , the incremental social welfare of its own country is given by

$$W(s) - W(0) = \frac{ns}{(m+n+1)^2} [(m+1-n)(a-c) - n(m+1)s] . \quad (15)$$

Whether or not the implementation of an export subsidy,  $s$ , improves the domestic social welfare depends on the level of  $s^{20}$ . The sign of  $\Delta W \begin{matrix} \geq \\ \leq \end{matrix} 0$  is rewritten as

$$s \begin{matrix} \leq \\ \geq \end{matrix} \frac{(m+1-n)(a-c)}{(m+1)n} . \quad (16)$$

Substituting Eq.(10) into  $s$  in Eq.(16), we obtain

$$\gamma \begin{matrix} \geq \\ \leq \end{matrix} \frac{2(m+1)^2}{n(m+1-n)} . \quad (17)$$

If the size of political weight,  $\gamma$ , is smaller than the right hand side of Eq.(17), the domestic country is worse off at the equilibrium in export subsidy than under free trade.

Differentiating the right hand side of Eq.(17) with respect to  $n$  and  $m$ , under  $n < \frac{m+1}{2}$

$$\frac{\partial RH}{\partial n} = -\frac{2(m+1-2n)(m+1)^2}{[n(m+1-n)]^2} < 0 ,$$

$$\frac{\partial RH}{\partial m} = \frac{2n(m+1)(m+1-2n)}{[n(m+1-n)]^2} > 0 ,$$

where  $RH$  is the right hand side of Eq.(17). When the number of the foreign firms is large in comparison with that of the home firms,  $\gamma$  is likely to be smaller than the right hand side of Eq.(17) due to a decrease in the number of home firms or an increase in that of foreign firms. We can consider the reasons as follows. When the number of home firms which can organize a lobby is relatively very small, the home firms give much political donation to the government and so the government fork out high export subsidy

to them (See Proposition 1 and Proposition 2). This export subsidy is so high that the opportunity cost of the government revenue, which is assumed to be equal to one, can exceed the profit-shifting gain net of the terms of trade loss. Hence,  $W(0)$  will be larger than  $W(s^p)$ . In Figure 5 we demonstrate the welfare level of the domestic country for varying the number of the home firms under the same numerical value as in Figure 2. In Figure 5, we can confirm that  $W(0)$  is larger than  $W(s^p)$  under the condition; Compared with the number of foreign firms ( $m = 10$ ), the number of home firms which can organize the lobby is very small (i.e.  $n = 2$ ).

Furthermore, in Figure 5 we find out that  $W(0)$  is larger than  $W(s^p)$  under the condition; The number of home firms which can organize the lobby is almost the same as that of the foreign firms (i.e.  $n = 9, 10$ )<sup>21</sup>. We can consider the reasons as follows. When the number of home firms which can form a lobby is almost the same as that of the foreign firms, the implementation of politically optimal export subsidy leads to the larger terms of trade loss. As a result, the profit-shifting gain net of the terms of trade loss is smaller than the opportunity cost of the government revenue and  $W(0)$  will be larger than  $W(s^p)$ .

Recall that the part of the costs of forming and maintaining the lobby can be socially wasteful. As Krueger(1974) and Bhagwati(1982) point out, rent seeking activity, which only influences the government decision, is unproductive and thus this activity can deteriorate the social welfare. Lobbying by the home firms can indirectly affect the domestic social welfare in this way<sup>22</sup>. If a part of the organizational costs, say 100, is socially wasted,  $W(s^p)$  shifts down to  $W(s^p)(with\ welfare\ loss - 1)$  in the figure. As is seen in the Figure 5,  $W(0)$  can be larger than  $W(s^p)$  even if the number of home firms is 5, 6, 7 or 8. Moreover, when the socially wasted organizational costs are 200,  $W(s^p)$  shifts down to  $W(s^p)(with\ welfare\ loss - 2)$ . We can see in Figure 5 that  $W(0)$  is always larger than  $W(s^p)$ .

The following proposition summarizes the results of this section.

**Proposition 4** *The conditions where the government's implementation of politically optimal export subsidy is likely to make the domestic social welfare worse off than under the free trade are as follows: (i)the number of home firms is much smaller than that of foreign firms; (ii)the number of home firms is almost the same as that of foreign firms; or (iii)the large portion of organizational costs of lobby is*

*socially wasted.*

Considering that the conditions in this proposition are realistic, we can say, from a viewpoint of political economy, it is desirable to impose restrictions on the government's implementation of export subsidy by a multilateral agreement which prohibit export subsidies, like the Article 3.1(a) of the Uruguay Round Agreement on Subsidies and Countervailing Measures.

## 7 Concluding Remarks

In the real world, a government does not necessarily aim at maximizing social welfare but at maximizing political support in order to win elections. Thus, the home firms which can organize a lobby use political pressure to induce the government to fork out more export subsidy to them. What we have analyzed, in this paper, is the influence of lobbying by the home firms in the same industry on the government's enforcement of export subsidy. Particularly, our focus has been on the political contribution activity by the home firms and their lobby formation. Our findings are the followings.

When the home firms which can organize a lobby offer their campaign contribution to the incumbent government, the government selects the politically optimal export subsidy which is higher than the welfare-maximizing export subsidy for its own country. When the number of home (foreign) firms increases, the government selects lower (higher) export subsidy. Furthermore, the effect of the number of home and foreign firms on their joint campaign contribution corresponds to that on the politically optimal export subsidy level. When the number of home (foreign) firms becomes larger, the amount of their joint campaign contribution smaller (larger).

We have also investigated the influence of the change in the number of foreign firms on the home firm's lobby formation. When the home firms must bear the cost of forming an organized lobby in order to overcome the free-rider problem associated with lobbying and give political donation to the government for higher export subsidy, an increase in the number of foreign firms makes it easier for them to form an organized lobby. We have noted that whether or not the home firms can form and maintain a lobby depends on the ratio of the number of home firms to that of foreign firms.

Moreover, we have examined the effect of the implementation of the politically optimal export subsidy on the domestic social welfare. The conditions under which the government's implementation of politically optimal export subsidy is likely to make the domestic social welfare worse off than under the free trade are as follows: (i) the number of home firms is much smaller than that of foreign firms; (ii) the number of home firms is almost the same as the number of foreign firms; or (iii) the large portion of organizational costs of lobby is wasteful socially. Since these conditions are realistic, this conclusion can provide a political economic rationale for multilateral agreement which prohibit export subsidies, like the Article 3.1(a) of the Uruguay Round Agreement on Subsidies and Countervailing Measures.

There is room for further examination in this paper. First, we have analyzed the situation where the government implements too much export subsidy as a result of political pressure from the domestic firms. In the real world, the home firms' lobbying will induce the government to choose unsuitable industries as targets of export subsidy. This point should be investigated as a future agenda. Second, we have used the exogenously given organizational cost to form and maintain a lobby which can overcome the free-rider problem associated with political activity. We may be able to examine endogenous mechanism to solve the free rider problem using an infinitely repeated game setting.

## Notes

1 If the model setting about market structure and the type of firm's competition is changed, the positive subsidy may not increase social welfare. See Eaton and Grossman(1986) and Grossman(1986).

2 See Grossman(1986) and Krugman(1987).

3 See Brander and Spencer(1985) and Collie(1993). In the real world, governments repeatedly have a relationship with each other. If the game between the governments is infinitely repeated, free trade can be sustainable as a perfect Nash equilibrium. For discussion of the sustainability of free trade, see Collie(1993).

4 Collie(2000), which focuses on opportunity costs of government revenue which are posed by implementation of an export subsidy, analyzes an economic rationale for a multilateral agreement which prohibits export subsidies.

5 Those are called "the endogenous protection theory". Hillman(1989), Rodrik(1995) and Helpman(1997) are comprehensive surveys of the endogenous protection theory.

6 Olson(1965) claims that there is a strong relationship between the size of a group with common interests and its ability of lobbying: an increase in the number of members with common interests makes it more difficult for them to overcome the free-rider problem associated with lobbying.

7 The eligible voter in home country are assumed to be unable to make political contributions. Because the costs of export subsidy is so widely dispersed that it does not induce them to engage themselves in political activity. By contrast, the home firms are eager to lobby politicians for implementation of higher export subsidy because the benefits of export subsidy is so concentrated on them.

8 Hillman and Ursprung(1988) and Grossman and Helpman(1995) deals with this topic.

9 See Mitra(1999) p.1120.

10 See Werden and Baumann(1986) pp.332-333.

11 For detailed arguments for the free-rider problem, see Appendix A.

12 For detailed arguments for an informed voter, see Baron(1994), Grossman and Helpman(1996).

13 See Grossman and Helpman(1994) for the government's objective function.

14 On the lobbying activity of the home firms, we easily the following results,

$$\frac{\partial \pi_i}{\partial s} = \frac{2(m+1)[a-c+(m+1)s]}{(m+n+1)^2 b} > 0 .$$

Hence, the home firms have an incentive to lobby for higher export subsidy.

15 In modeling of the policy-making mechanism, we basically follow Grossman and Helpman(1994), who drew on a menu auction model developed by Bernheim and Whinston(1986). See also Dixit, Grossman and Helpman(1997).

16 See Proposition 1 in Grossman and Helpman(1994) p.839.

17 We differentiate  $s^o$  with respect to  $n$ ;  $\frac{\partial s^o}{\partial n} = -\frac{\gamma(a-c)}{2n^2} < 0$ .

18 We differentiate  $s^o$  with respect to  $n$ ;  $\frac{\partial s^o}{\partial n} = -\frac{\gamma(a-c)}{2n^2} < 0$ .

19 When the organizational cost for lobbying is very low, the home firms can organize a lobby even if the number of companies are nine or ten in Figure 4.

20 The implementation of a export subsidy leads to the larger third country's social welfare and the smaller foreign country's one.

21 Under this condition,  $\gamma$  is smaller than the right hand side of Eq.(17).

22 This point is also suggested by Moore and Suranovic(1993).

## Appendix

Here, we analyze the sufficient condition of the free-rider problem associated with lobbying. It is assumed that the home firms must contribute money, the amount of  $C_j^p$ , in order to induce the government to implement the export subsidy,  $s^p$ , which is higher than the welfare-maximizing export subsidy,  $s^o$ , and that the home firms must bear the fixed costs,  $f$ , to lobby for higher export subsidy. There are  $n$  home firms, which are symmetric. Each home firm which joins in cooperative lobbying bears the  $h$ th part of the organizational costs.  $h$  represents the number of the home firms which cooperate in lobbying:  $h = n - d$ , where  $d$  stand for the number of the home firms which defect from the cooperative lobbying. When the home firms can not lobby, the government chooses the welfare-maximizing export subsidy,  $s^o$ .

Each home firm's profit is denoted as follows:  $V_j^c = \pi(t^p) - \frac{C_j^p+f}{n}$  under the cooperative lobby;  $V_j^d = \pi(t^p)$  under its defection from the cooperative lobbying;  $V_j^b = \pi(t^p) - \frac{C_j^p+f}{n-d}$  when other home firms defect from the cooperative lobbying; and  $V_j^n = \pi(t^o)$  when none of the home firms cooperates in lobbying.

It is obvious that  $V_j^d$  is larger than  $V_j^c$ . When  $\frac{C_j^p+f}{n-d} > \pi(t^p) - \pi(t^o)$ ,  $V_j^n$  is larger than  $V_j^b$ . Since  $\frac{C_j^p+f}{n-d}$  is a minimum in the case of  $d = 1$ , "Defect from the cooperative lobbying" is always each home firm's dominant strategy when  $\frac{C_j^p+f}{n-1} > \pi(t^p) - \pi(t^o)$ . Therefore, when  $\frac{C_j^p+f}{n-1} \geq \Delta\pi$  is satisfied, the free-rider problem associated with lobbying comes about.

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Figure.1

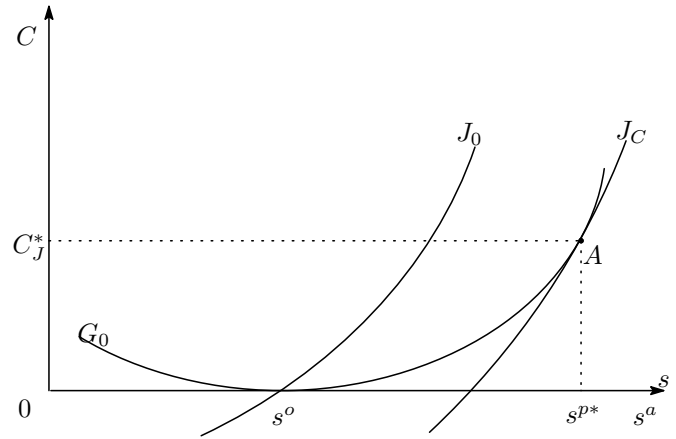


Figure 2

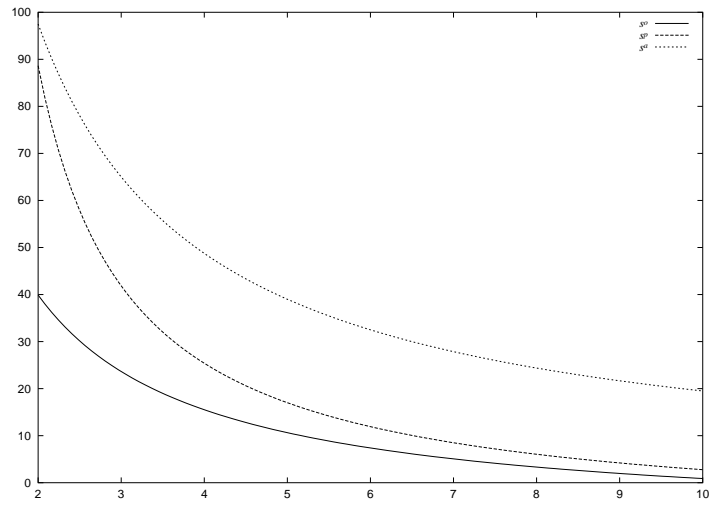


Figure 3

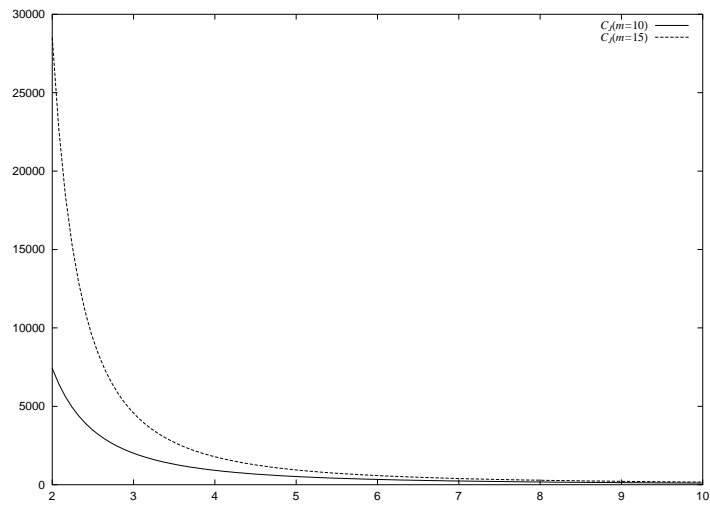


Figure 4

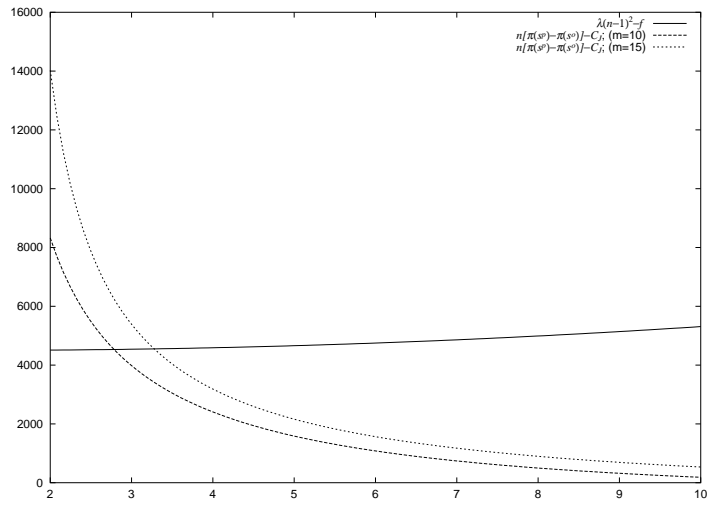


Figure 5

