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Endogenous Lobbying Positions

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Abstract

This paper develops a two-country, two-firm model to study equilibrium lobbying positions in intra-industry trade. A firm chooses either a protectionist position or a free-trade position. The model predicts that taking the free-trade lobbying position is an efficient firm's dominant strategy. If two firms have high costs (or when the demand is very weak), there exist two equilibria: either both firms take the free-trade position or both take the protectionist lobbying position. In other cases, both firms taking the free-trade lobbying position is a unique equilibrium.

1. Introduction

Nowadays, many firms (multinational firms) compete in multiple markets. When a firm competes in both its domestic market and in foreign markets and contemplates adopting particular business strategies, it needs to consider the strategies' effects on its profits in both types of market. In particular, if a firm lobbies its domestic government for protection, its profit from the domestic market will increase. If, however, it lobbies for global free trade, its profit from the foreign market will rise. Hence, the firm needs to compare the effect of lobbying for protection and the effect of lobbying for free trade. This paper examines how a firm's competitiveness determines whether to lobby for protection from its domestic government (the protectionist lobbying position) or to lobby for free trade from the foreign government (the free-trade lobbying position).

The literature on the political economy of trade policy has basically ignored lobbying for changes in a foreign country's trade policy, except in the papers by Hillman and Ursprung (1988) and Husted (1991). Such lobbying activities, however, do exist in reality and are important. There are three means by which foreign policy can be influenced by domestic lobbying groups. First, domestic lobby groups hire foreign law firms to lobby the foreign firms' governments. Secondly, interest groups lobby their own governments to put pressure on foreign governments. Thirdly, as commonly observed, interest groups lobby domestic governments to participate in international trade agreements and organizations, such as NAFTA and the WTO, which affect foreign countries' trade policies. The present paper explicitly analyzes a firm's decision to lobby a foreign government for free trade.

More importantly, in the existing literature there has been no study on *endogenous lobbying positions*. The research effort until now has focused on lobbying incentives and outcomes, with the interest groups' (or the firms') lobbying positions exogenously given.[1] The endogeneity issue has not been explored because the existing models have always assumed that a firm is either an import-competing firm or an exporting firm (but not both) and hence its lobbying position is clearly predetermined. However, many firms compete in both domestic and foreign markets, and hence their lobbying positions

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are not obviously predetermined.[2] They may switch positions once market conditions or technology conditions change. The automobile industry in the United States provides a good example of endogenous and changing lobbying positions. The American car makers generally supported free trade in the 1970s, but they sought protection in the 1980s when Japanese car makers became very competitive.

In this paper, I develop a two-country, two-firm model to study equilibrium lobbying positions with intra-industry trade.[3] The model predicts that taking the free-trade lobbying position is an efficient firm's dominant strategy. If both firms have high costs (or the demand is very weak), there are two equilibria: either both take the free-trade lobbying position or both take the protectionist lobbying position. In other cases (when one firm's costs are low), both firms taking the free-trade lobbying position is a unique equilibrium. I identify two incentives, lowering foreign tariffs and avoiding lobbying competition, to explain the above results.

These results help to explain some empirical observations. For example, Marvel and Ray (1987) and Ray (1991) have found that protection is lower in industries with more intra-industry trade. This result is consistent with the prediction of the present study: with intra-industry trade, firms do not take the protectionist lobbying position unless the market is very weak or all firms' costs are very high. Our results also predict that in a world where productivity rises over time, we should see declining endogenous tariff levels.

2. The Model

There are two countries, each of which has one firm in the industry to be considered. The firms produce homogeneous goods and sell in both countries' markets. As in the familiar reciprocal-dumping model, we assume that the two markets are segmented. Firm i ($i = 1, 2$) produces the amount equal to x_{ij} for market j ($j = 1, 2$). The inverse demand function in market j is $p_j = a - (x_{1j} + x_{2j})$, where $a > 0$ is a constant and it measures market size. Firm i's constant marginal cost is c_i. Country i's tariff is t_i (a specific tariff levied on each unit of imports).

The structure and sequence of the non-cooperative game is as follows. There are three stages. In stage 1, the firms take their respective lobbying positions and determine their lobbying contributions simultaneously. A firm can lobby its domestic government for a higher import tariff, in which case it takes the *protectionist lobbying position*, or it can lobby the foreign government for a lower tariff, in which case it takes the *free-trade lobbying position*.[4] Lobbying takes the form of making financial contributions to the target (lobbied) government. Specifically, each firm offers its target government a contribution schedule, which is a function of the tariff that the government will adopt. Let $D(\cdot)$ be the domestic lobbying function and $F(\cdot)$ be the foreign lobbying function. If firm i lobbies its domestic government, then $D_i(t_i)$is firm i's committed contributions (the amount of money) to government i if government i sets its tariff equal to t_i; and if firm i lobbies the foreign government, then $F_i(t_j)$is firm i's committed contributions (the amount of money) to government j if government j sets its tariff equal to t_j.

The protectionist lobbying position and the free-trade lobbying position are "behaviorally incompatible" in the following sense: government 1 may be willing to accept firm 2's contributions and in return may lower the tariff; however, if firm 2 also lobbies government 2 to raise the tariff, this will hurt firm 1 and government 1 will not be pleased; that is, firm 2 is doing two things at the same time, both of which conflict with government 1's interest. For this reason, we assume that government 1 rejects firm 2's contribution if firm 2 also lobbies government 2 for protection. Given this assumption,

a firm will not lobby the domestic and foreign government at the same time. Accordingly, we confine our discussion to the case when a firm can take one lobbying position only. If firm i lobbies its domestic government, it will not lobby the foreign government and thus $F_i = 0$; if it lobbies the foreign government, it will not lobby its own government and thus $D_i = 0$. Thus, the constraint of lobbying only one government can be represented by $D_i F_i = 0$. Note that in a more general setting—see, for example, Katayama and Ursprung (2004)—tariffs are determined from lobbying and electoral competition between consumers and producers via the political process. In order to focus on analyzing a firm's lobbying position, the present paper ignores consumer lobbying and electoral competition. Indeed, this is a common approach in many studies of lobbying in the literature (e.g. Grossman and Helpman, 1994).

In stage 2, the governments determine their respective tariff levels, with knowledge of the contribution schedules offered by the firms in the first stage. In stage 3, the firms compete in the product markets by choosing their respective quantities, i.e. they engage in Cournot competition.

3. Analysis

We work backward to obtain the subgame-perfect Nash equilibrium.

Stage 3

Given the second-stage outcome, i.e. the tariffs $\{t_1, t_2\}$ chosen by the governments, in the last stage, firm i's market profit (i.e. its total profit excluding lobbying contributions) derived from market i is $\pi_{ii} = (p_i - c_i)x_{ii}$ and that from market j $(j \neq i)$ is $\pi_{ij} = (p_j - c_i - t_j)x_{ij}$. A firm's total market profit is the sum of both profits: $\pi_i \equiv \pi_{i1} + \pi_{i2}$. By using these profit functions, we can easily derive the Cournot–Nash equilibrium of each firm's output in each market: $x_{ii} = (a - 2c_i + c_j + t_i)/3$ and $x_{ij} = (a - 2c_i + c_j - 2t_j)/3$. The market prices are $p_i = (a + c_1 + c_2 + t_i)/3$. As a result, firm i's equilibrium profits are

$$\pi_i = \tfrac{1}{9}(a - 2c_i + c_j + t_i)^2 + \tfrac{1}{9}(a - 2c_i + c_j - 2t_j)^2, \quad (i \neq j). \tag{1}$$

Based on (1), we know that if there is a marginal increase in t_i, then firm i benefits from a profit increase in the domestic market, by an amount equal to $\frac{2}{9}(a - 2c_i + c_j + t_i)$. If there is a marginal decrease in t_j, firm i benefits from a profit increase in the foreign market, by an amount equal to $\frac{4}{9}(a - 2c_i + c_j - 2t_j)$. By comparing these two benefits, we know that firm i benefits more from lowering the foreign tariff than from increasing the domestic tariff if and only if $(a - 2c_i + c_j) > t_i + 4t_j$. This inequality is more (less) likely to hold if firm i's cost is low (high). Why? From the firm's point of view, increasing the domestic tariff is equivalent to raising the rival firm's cost, while reducing the foreign tariff is equivalent to lowering the firm's own cost. If the cost changes occur in the same market, then the firm always prefers lowering its own cost than raising the rival firm's cost (this can be easily observed from the firm's equilibrium profit in any given market). However, in the above tariff change case, the firm's cost is reduced in the foreign market and its rival firm's cost is increased in the domestic market. If the firm's cost is very high, given its disadvantage in the foreign market (because it faces the foreign tariff) relative to the domestic market (because its rival firm faces the tariff), its output (market share) in the foreign market is very small. In such a case, lowering its cost in the foreign market will not help the firm much, but increasing its rival firm's cost in the domestic market will help the firm a lot because it still produces a significant amount

(market share) in this protected market. For convenience of discussion, let us use the term "lowering-foreign-tariff incentive" to indicate the difference in a firm's benefit from lowering the foreign tariff and the benefit from increasing the domestic tariff. Then, we can say that a firm's lowering-foreign-tariff incentive is stronger when its cost is lower.

From the above analysis, we have established the following lemma.

LEMMA 1. *A firm benefits more from lowering the foreign tariff than from increasing the domestic tariff if and only if its production cost is low (the precise condition is* $c_i < (a + c_j - t_i - 4t_j)/2$*). A firm's lowering-foreign-tariff incentive increases as its cost decreases.*

The above comparison is based on the changes in tariffs being given exogenously. Below we analyze the firms' decision to lobby the governments for tariff changes.

Stage 2

We now turn to analyzing the second-stage tariff setting for any given first-stage lobbying contributions. To make the analysis tractable, let us focus on linear contribution schedules. Specifically, we assume that $D_i(t_i) = d_{0i} + d_i t_i$ and $F_i(t_j) = f_{0i} + f_i t_j$. We focus our analysis on government 1. Given D_1 and F_2, which are the two possible contributions made to government 1, it chooses its tariff level (t_1) to maximize its objective function, which is the weighted sum of the country's consumer surplus (CS_1), its firm's profits (Π_1), the tariff revenue (TR_1), and the received lobbying contributions (D_1 and F_2):

$$W_1(t_1) = CS_1 + \Pi_1 + TR_1 + \beta D_1 + s\beta F_2, \quad \beta > 1 \text{ and } s \in [0, 1]. \tag{2}$$

In the above function, $\Pi_1 = \pi_1 - D_1 - F_1$, $TR_1 = t_1 x_{21}$, β represents the value that government 1 places on lobbying contributions, and s represents the discount on the foreign contributions. Alternatively, s can also be viewed as the relative effectiveness of foreign lobbying compared with domestic lobbying. We assume that both governments have the same β and s. Using the third-stage equilibrium outcome, we have

$$CS_1 = \tfrac{1}{18}(a - c_1 - c_2 - t_1)^2 \quad \text{and} \quad TR_1 = \tfrac{1}{3}(a + c_1 - 2c_2 - 2t_1)t_1.$$

From the first-order condition of government 1's optimization, $\partial W_1/\partial t_1 = 0$, we can solve for the optimal tariff

$$t_1 = \frac{a - c_2}{3} + (\beta - 1)d_1 + s\beta f_2. \tag{3}$$

Note that t_2 does not affect government 1's value derived from market 1 and thus it does not enter government 1's first-order condition. Thus, government 1's optimal tariff level, as given in (3), does not depend on government 2's tariff decision. Similarly, we obtain government 2's optimal tariff decision as, for given D_2 and F_1,

$$t_2 = \frac{a - c_1}{3} + (\beta - 1)d_2 + s\beta f_1. \tag{4}$$

Stage 1's Equilibrium Contribution Schedules

We analyze the first-stage lobbying equilibrium in two steps. First, we derive the equilibrium contribution schedules by the firms in various cases (i.e. for various

combinations of lobbying positions). Then, we compare the firms' profits in various cases to determine the equilibrium lobbying positions.

First, we derive the equilibrium contribution schedules. Since $D_iF_i = 0$, there are four distinct outcomes from the first stage. They are

- *Case A* (when both firms lobby government 1): $D_1 > 0$ and $F_2 > 0$ (implying $F_1 = 0$ and $D_2 = 0$);
- *Case B* (when both firms lobby their domestic governments): $D_1 > 0$ and $D_2 > 0$ (implying $F_1 = 0$ and $F_2 = 0$);
- *Case C* (when both firms lobby the foreign governments): $F_1 > 0$ and $F_2 > 0$ (implying $D_1 = 0$ and $D_2 = 0$);
- *Case D* (when both firms lobby government 2): $F_1 > 0$ and $D_2 > 0$ (implying $D_1 = 0$ and $F_2 = 0$).

Based on (3) and (4), it is clear that firm 1 would prefer $d_1 > 0$ (and so D_1 increases in t_1) to encourage government 1 to set a higher tariff, while firm 2 would prefer $f_2 < 0$ (and so F_2 decreases in t_1) to induce the government to lower its tariff. We analyze below how d_i and f_i are determined in equilibrium.

Consider Case A first. The firms choose their contribution schedules for government 1 to maximize their profits from market 1, knowing that government 1 will optimally respond according to (3). Specifically, firm 1 chooses d_{01} and d_1, while firm 2 chooses f_{02} and f_2. From (3), it is clear that d_{01} and f_{02} do not affect government 1's tariff level. Hence, for profit maximization, firm 1 will set d_{01} as low as possible, so long as $D_1 > 0$, and firm 2 will set f_{02} as low as possible, so long as $F_2 > 0$. Then, firm 1's maximization problem boils down to choosing d_1 to maximize Π_1. From the corresponding first-order condition, we obtain the following reaction function (for given f_2):[5]

$$d_1 = \frac{2(\beta-1)(4a-6c_1+2c_2)-9(a-c_2)-3s\beta(11-2\beta)f_2}{6(\beta-1)(10-\beta)}. \tag{5}$$

Firm 2's profit is $\Pi_2 = \pi_2 - D_2 - F_2$, where $D_2 = 0$ in this case. Firm 2 chooses f_2 to maximize Π_2, resulting in the following reaction function (for given d_1):

$$f_2 = -\frac{s\beta(7a+3c_1-10c_2)-9(a-c_2)-3(\beta-1)(9+4s\beta)d_1}{6s\beta(9+2s\beta)}. \tag{6}$$

Without loss of generality, we specify the market size to a certain level, say $a = 10$. Correspondingly, we impose the restriction $c_i \in [0, 5]$ so that both firms always produce positive output for each market under free trade.[6] Furthermore, in order to see the effect of productivity on the choice of lobbying positions as clearly as possible, we specify $\beta = 5/2$ and $s = 3/5$. As we will discuss in the concluding section, the qualitative result of this paper is not sensitive to such specification and we can easily see how the equilibrium will move as β and s change. Solving the two reaction functions yields their equilibrium value

$$d_1^A = \tfrac{14}{9} - \tfrac{1}{3}c_1 + \tfrac{8}{45}c_2, \quad f_2^A = -\left(\tfrac{25}{9} - \tfrac{1}{6}c_1 - \tfrac{1}{9}c_2\right).$$

Substituting the above equilibrium values into (3) gives the (endogenous) optimal tariff

$$t_1^A = \tfrac{3}{2} - \tfrac{1}{4}c_1 + \tfrac{1}{10}c_2.$$

Now we consider Case B. Then, $f_2^B = 0$ in (5), and $d_1^B = \tfrac{4}{9} - \tfrac{4}{15}c_1 + \tfrac{2}{9}c_2$. From (3), we obtain the corresponding optimal tariff

$$t_1^B = 4 - \tfrac{2}{5}c_1.$$

In Case C, we have $d_1^C = 0$ in (6) and $f_2^C = -\left(\tfrac{65}{36} + \tfrac{1}{24}c_1 - \tfrac{2}{9}c_2\right)$. From (3) we obtain the corresponding optimal tariff

$$t_1^C = \tfrac{5}{8} - \tfrac{1}{16}c_1.$$

Finally, we consider Case D, in which government 1 is not subject to any lobbying. Then, $d_1^D = f_2^D = 0$ and from (3) we obtain the corresponding optimal tariff

$$t_1^D = \frac{10 - c_2}{3}.$$

After determining d_i and f_i (the variable parts of a firm's contribution schedule) and knowing the resulting equilibrium tariff rates, we now turn to examining how the firms choose the constant terms of their contribution schedules, in order to determine the entire contribution schedules.

Firm 1 always sets $d_{01} = 0$ because this is the minimum (and so optimal) level that guarantees $D_1(t_1) > 0$ for all $t_1 > 0$ in Case A and Case B (i.e. when $D_1 \neq 0$): $D_1^A(t_1) = d_1^A t_1 > 0$ and $D_1^B(t_1) = d_1^B t_1 > 0$ for all $t_1 > 0$.

However, because $f_2 < 0$, firm 2 must choose $f_{02} > 0$ in order to ensure that $F_2(t_1) > 0$ for t_1 within the relevant ranges (see below) in Case A and Case C (i.e. when $F_2 \neq 0$). In Case A, firm 2 will set f_{02} to be as small as possible such that $F_2^A(t_1) = f_{02} + f_2^A t_1 > 0$ for all $t_1 \leq t_1^A$, because, from firm 2's point of view, there is no need to make a positive contribution for $t_1 > t_1^A$. This lowest f_{02} is chosen such that government 1 is indifferent between accepting firm 2's contributions (and then choosing t_1^A) and not accepting firm 2's contributions (and then choosing t_1^B). That is, f_{02} is a solution to $W_1^A(t_1^A) = W_1^B(t_1^B)$, where $W_1^A(t_1^A)$ is obtained with d_1^A and f_2^A, and $W_1^B(t_1^B)$ is obtained with d_1^B and $f_2^B = 0$. Solving the equation yields the optimal f_{02}:

$$f_{02}^A = \tfrac{55}{12} - \tfrac{49}{60}c_1 + \tfrac{13}{400}c_1^2 + \tfrac{1}{60}c_1c_2 - \tfrac{1}{10}c_2 - \tfrac{1}{300}c_2^2.$$

Similarly, in Case C, firm 2 will set f_{02} to be as small as possible such that $F_2^C(t_1) = f_{02} + f_2^C t_1 > 0$ for all $t_1 \leq t_1^C$. Thus, the optimal f_{02} will cause government 1 to be indifferent between accepting firm 2's contributions (and then setting t_1^C) and not accepting firm 2's contributions (and then setting t_1^D). That is, f_{02} is chosen such that $W_1^C(t_1^C) = W_1^D(t_1^D)$, where $W_1^C(t_1^C)$ is obtained with $d_1^C = 0$ and f_2^C, and $W_1^D(t_1^D)$ is obtained without any lobbying to government 1. The solution is

$$f_{02}^C = \tfrac{6175}{1728} + \tfrac{5}{192}c_1 - \tfrac{1}{768}c_1^2 - \tfrac{20}{27}c_2 + \tfrac{1}{27}c_2^2.$$

In summary, we have derived the equilibrium contribution schedules made to government 1 in the four cases. These schedules are made from $d_{01} = 0$, d_1^i, f_{02}^i, and f_2^i (for $i = A, B, C, D$), as given above.

From the above results, we can easily obtain the following inequalities: $\partial d_1^i / \partial c_1 < 0$, $\partial f_2^i / \partial c_2 > 0$, and $\partial f_{20}^i / \partial c_2 < 0$. Thus, when a firm's cost decreases, its domestic lobbying schedule becomes steeper (having a positive slope), while its foreign lobbying function becomes flatter (having a negative slope) and has a larger intercept. These outcomes imply that the more efficient a firm is, the more it is willing to contribute to the government in exchange for a more favorable policy. In this sense, we say that the firm is more aggressive in lobbying. The intuition is as follows. As a firm's cost decreases, its market share increases. As a result, the marginal benefit from

lobbying increases. This leads to an increase in the firm's optimal lobbying effort (contributions).

By symmetry, we can easily derive the equilibrium lobbying schedules made to government 2 under the corresponding four cases. We also have $\partial d_2^i/\partial c_2 < 0$, $\partial f_1^i/\partial c_1 > 0$, and $\partial f_{10}^i/\partial c_1 < 0$. We summarize the above comparative statics in Lemma 2 below.

LEMMA 2. *When a firm becomes more efficient, it lobbies more aggressively.*

Stage 1's Equilibrium Lobbying Positions

Now we turn to the second step of the first-stage analysis: we compare the firms' profits in various cases and determining the firms' equilibrium lobbying positions.

Based on the above equilibrium lobbying schedules and the resulting equilibrium tariffs, we can calculate each firm's profit (including lobbying contributions) from each market. Denote firm i's profit from market j in case k by Π_{ij}^k. In Case A, the calculation shows that the two firms' profits in market 1 are, respectively,

$$\Pi_{11}^A = \tfrac{445}{36} - \tfrac{175}{36}c_1 + \tfrac{23}{48}c_1^2 - \tfrac{17}{36}c_1c_2 + \tfrac{43}{18}c_2 + \tfrac{7}{60}c_2^2,$$

$$\Pi_{21}^A = \tfrac{307}{36} + \tfrac{427}{180}c_1 + \tfrac{161}{1200}c_1^2 - \tfrac{91}{180}c_1c_2 - \tfrac{367}{90}c_2 + \tfrac{137}{300}c_2^2.$$

In Case B, their profits in market 1 are, respectively,

$$\Pi_{11}^B = 20 - \tfrac{56}{9}c_1 + \tfrac{8}{15}c_1^2 - \tfrac{4}{9}c_1c_2 + \tfrac{20}{9}c_2 + \tfrac{1}{9}c_2^2,$$

$$\Pi_{21}^B = \tfrac{28}{9} + \tfrac{44}{15}c_1 + \tfrac{3}{25}c_1^2 - \tfrac{8}{15}c_1c_2 - \tfrac{32}{9}c_2 + \tfrac{4}{9}c_2^2.$$

In Case C, their profits in market 1 are, respectively,

$$\Pi_{11}^C = \tfrac{1}{2304}(170 - 33c_1 + 16c_2)^2,$$

$$\Pi_{21}^C = \tfrac{13625}{1728} + \tfrac{1225}{576}c_1 + \tfrac{89}{768}c_1^2 - \tfrac{4}{9}c_1c_2 - \tfrac{100}{29}c_2 + \tfrac{11}{27}c_2^2.$$

In Case D, their profits in market 1 are, respectively,

$$\Pi_{11}^D = \tfrac{4}{81}(20 - 3c_1 + c_2)^2,$$

$$\Pi_{21}^D = \tfrac{1}{81}(40 + 3c_1 - 7c_2)(10 + 3c_1 - 4c_2).$$

For symmetry, we can easily derive the two firms' profits in market 2 in the four cases, which can be done by simply switching the domestic firm's and foreign firm's positions and switching c_1 and c_2 in the above profit expressions.

With the above profits corresponding to various lobbying position combinations, we are now ready to make profit comparisons in order to derive the firms' optimal decisions on their lobbying positions. Our analysis focuses on firm 1.

First, suppose that $F_2 > 0$; that is, firm 2 take the free-trade lobbying position (which also implies $D_2 = 0$). Then, the relevant cases for firm 1 to compare its total profit are Case A and Case C. If firm 1 takes the protectionist lobbying position, we have Case A in market 1 and firm 1's profit (including lobbying costs) is Π_{11}^A. In the foreign market,

no firm lobbies the foreign government. Hence, the corresponding case in market 2 is D (no firm lobbies the local government) and firm 1's profit there is Π_{12}^{D} (note that, in the preceding analysis, we did not derive the expression for a firm's profit in market 2, but as pointed out before, Π_{12}^{D} will be similar to Π_{21}^{D} with the cost switch, i.e. $\Pi_{12}^{D} = \frac{1}{81}(40+3c_2-7c_1)(10+3c_2-4c_1)$). Therefore, by taking the protectionist lobbying position, firm 1's total profits (including lobbying costs) from the two markets are

$$\Pi_{1,1} = \Pi_{11}^{A} + \Pi_{12}^{D} = \tfrac{5605}{324} - \tfrac{2495}{324}c_1 + \tfrac{1069}{1296}c_1^2 + \tfrac{229}{54}c_2 + \tfrac{41}{180}c_2^2 - \tfrac{95}{108}c_1c_2,$$

where, in the subscript of Π, the first number denotes firm 1's lobbying position (in this case, firm 1 lobbies government 1), while the second number denotes firm 2's lobbying position (in this case, firm 2 lobbies government 1).

However, if firm 1 takes the free-trade position (lobbying the foreign government), we have Case C in market 1 and also Case C in market 2. Then, firm 1's total profits from the two markets are

$$\Pi_{2,1} = \Pi_{11}^{C} + \Pi_{12}^{C} = \tfrac{8825}{432} - \tfrac{14815}{1728}c_1 + \tfrac{6083}{6912}c_1^2 + \tfrac{2585}{576}c_2 + \tfrac{523}{2304}c_2^2 - \tfrac{65}{72}c_1c_2.$$

By comparison, we have

$$\Delta\Pi_{F_2>0} = \Pi_{2,1} - \Pi_{1,1} = \tfrac{4055}{1296} - \tfrac{4525}{5184}c_1 + \tfrac{1145}{20736}c_1^2 + \tfrac{427}{1728}c_2 - \tfrac{1}{1280}c_2^2 - \tfrac{5}{216}c_1c_2.$$

Therefore, given that firm 2 takes the free-trade lobbying position, firm 1 takes the free-trade lobbying position if and only if $\Delta\Pi_{F_2>0} \geq 0$. We examine the necessary and sufficient conditions for this inequality in the Appendix.

Secondly, suppose that $D_2 > 0$; that is, firm 2 takes the protectionist lobbying position (which also implies $F_2 = 0$). Then, if firm 1 takes the protectionist lobbying position, we have Case B in market 1 and also Case B in market 2. Thus, firm 1's total profits from the two markets are

$$\Pi_{1,2} = \Pi_{11}^{B} + \Pi_{12}^{B} = \tfrac{208}{9} - \tfrac{88}{9}c_1 + \tfrac{44}{45}c_1^2 + \tfrac{232}{45}c_2 + \tfrac{52}{225}c_2^2 - \tfrac{44}{45}c_1c_2.$$

If, however, firm 1 takes the free-trade lobbying position, we have Case D in market 1 and Case A in market 2. Correspondingly, firm 1's total profits from the two markets are

$$\Pi_{2,2} = \Pi_{11}^{D} + \Pi_{12}^{A} = \tfrac{9163}{324} - \tfrac{2701}{270}c_1 + \tfrac{811}{900}c_1^2 + \tfrac{7043}{1620}c_2 + \tfrac{5947}{32400}c_2^2 - \tfrac{433}{540}c_1c_2.$$

By comparison, we have

$$\Delta\Pi_{D_2>0} = \Pi_{2,2} - \Pi_{1,2} = \tfrac{1675}{324} - \tfrac{61}{270}c_1 - \tfrac{23}{300}c_1^2 - \tfrac{1309}{1620}c_2 - \tfrac{1541}{32400}c_2^2 - \tfrac{19}{108}c_1c_2.$$

Therefore, given that firm 2 takes the protectionist lobbying position, firm 1 takes the free-trade lobbying position if and only if $\Delta\Pi_{D_2>0} \geq 0$. We examine the necessary and sufficient conditions for this inequality in the Appendix.

By symmetry, we can easily derive the corresponding profits and comparisons for firm 2. Based on these comparisons, we establish the following proposition.

Proposition. *Taking the free-trade lobbying position is always an efficient firm's dominant strategy. If both firms have high costs (in the shaded area of Figure 1), there exist two equilibria: either both take the free-trade lobbying position or both take the*

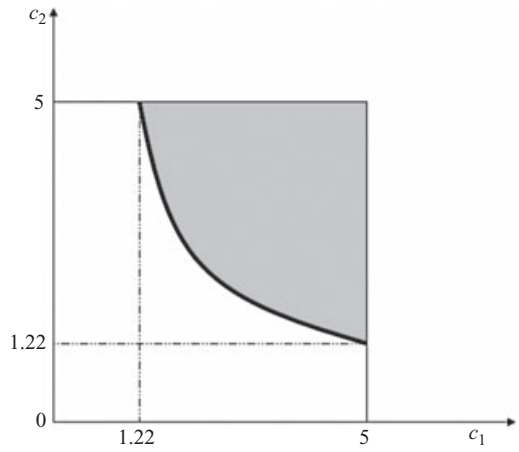

Figure 1. The Equilibrium Lobbying Positions

protectionist lobbying position. In other cases, both firms taking the free-trade lobbying position is a unique equilibrium.

Proof. See the Appendix.

Why do the firms' productivity levels affect their lobbying positions in equilibrium? Lemmas 1 and 2 can be used to explain this result.

According to Lemma 1, the firms have the lowering-foreign-tariff incentive, i.e. a firm prefers to lower the foreign tariff than to increase the domestic tariff. This incentive is in line with the free-trade lobbying position. However, this incentive is reduced as a firm's cost increases.

On the other hand, Lemma 2 shows that when a firm's cost is high, its lobbying effort is low. Furthermore, a firm's lobby becomes less effective if its rival firm also lobbies the same government than if the rival firm lobbies a different government. Hence, other things equal, a firm will prefer to avoid lobbying the same government as its rival firm. Let us call this the avoiding-lobbying-competition incentive for the convenience of discussion. The avoiding-lobbying-competition incentive is stronger when a firm's cost is higher.

Now, we see how all these effects intervene. When a firm's cost is low, the lowering-foreign-tariff incentive is strong. Moreover, the firm's lobbying is also very aggressive, which results in a larger tariff change. In return, this reinforces the lowering-foreign-tariff incentive. Thus, the firm chooses to lobby the foreign government for free trade, regardless of whether or not the rival firm also lobbies the same government, because, in this case, the lowering-foreign-tariff incentive dominates the avoiding-lobbying-competition incentive. Therefore, a low-cost firm's dominant strategy is to lobby the foreign government for free trade. Given this firm's dominant strategy, the other firm's optimal decision is to choose the free-trade lobbying position. This is because, if its cost is also low, it has a strong lowering-foreign-tariff incentive itself and its dominant strategy is to lobby the foreign government, but if its cost is high, it should also choose to lobby the foreign government due to the avoiding-lobbying-competition incentive. Therefore, the equilibrium is that both firms choose the free-trade position.

When both firms' costs are high, the lowering-foreign-tariff incentive is weak and the avoiding-lobbying-competition incentive is strong for both firms. The latter dominates the former. Thus, if one firm lobbies a given government, then lobbying a different government becomes the best response for the other firm. As a result, the equilibrium could be both firms lobbying their domestic governments, or both firms lobbying the foreign governments.

The proposition provides an explanation (the technology or productivity explanation) for why protectionism arises during some periods of time: protectionism may be due to increasing production costs. Note that raising both firms' costs in this model is equivalent (in the analysis of the model) to lowering market demand. Hence, another reason for rising protectionism is the weakened market demand. As a direct implication of the proposition, we have the following corollary.

Corollary. *When market demand becomes weak or the firms' productivity declines, protectionism (both firms lobbying for protection) may arise in equilibrium.*

The multiple equilibrium nature of the proposition in the case of both firms having high costs or weak demands suggests that international coordination, such as the WTO, is important to ensure that an efficient outcome be the reality.

Marvel and Ray (1987) and Ray (1991) have found that protection is lower in industries with more intra-industry trade. The results of the present study predict that, with intra-industry trade, very efficient firms do not lobby for protection at all, which should lead to lower protection.

4. Discussion and Concluding Remarks

This paper develops a model of the political economy of trade policy to study equilibrium lobbying *positions* in intra-industry trade. The model predicts that both firms lobbying for free trade is always an equilibrium, but when the firms are not efficient in production, both taking the protectionist lobbying position is also an equilibrium. The previous literature emphasizes the lobbying efforts and resulting tariff equilibrium when the firms' lobbying positions are not a choice variable. In the intra-industry trade environment, the lobbying position is an important decision variable and this paper provides a first attempt to analyze the problem.

If the model is extended to a dynamic setting in which the firms take their lobbying positions at the beginning of every period, then there may exist an equilibrium in which a firm switches from lobbying for free trade in one period to lobbying for protection in another, due to loss of competitiveness. This will be consistent with the observed lobbying behavior in the American automobile industry in the past three decades. Trefler (1993) has found that an industry facing increases in import penetration receives higher protection. The results of the present study predict that when a domestic firm's competitiveness decreases drastically, import penetration increases and the firm switches from the free-trade position to the protectionist position, which leads to a higher degree of protection. In contrast, the dynamic version of the present model would predict that in a world where costs of production fall over time, we should see declining endogenous tariff levels.

Given that the market size is specified at $a = 10$, we accordingly restrict the cost value to the range of $[0, 5]$ so that each firm produces a positive amount in both markets under free trade, regardless of the other firm's cost level. However, the firms still produce positive amounts in both markets if their costs are all high (e.g. $c_1 = c_2 = 8$), or

if one is high but the other is not too low (e.g. $c_1 = 6$ and $c_2 = 3$). Although restricting the costs to [0, 5] is reasonable ($c_i = 5$ is a very high cost relative to the market size), our analysis still holds in the extremely high-cost case (e.g. $c_1 = c_2 = 8$).

In order to focus on changes in productivity and to reduce the complexity of many mathematical expressions in the paper, we specified the values of β and s. Although we have not derived any result based on general β and s, we have tried a number of cases and found that our analysis and the qualitative aspect of the results are not sensitive to these specifications. In fact, we can conjecture that as β increases (when the governments value lobbying contributions more), lobbying increases. When s becomes very small, lobbying the foreign government is very costly and we would observe more cases of lobbying for protection in the equilibrium. It is interesting to realize that even when we have assumed efficiency loss from foreign lobbying ($s < 1$) in the present paper, lobbying foreign governments for free trade is still an equilibrium.

Appendix

Proof of the Proposition

(i) Suppose that $F_2 > 0$. Then, firm 1's lobbying position is determined by the sign of $\Delta\Pi_{F_2>0}$. Note that $\partial\Delta\Pi_{F_2>0}/\partial c_1 = -\frac{4525}{5184} + \frac{1145}{10368}c_1 - \frac{5}{216}c_2$, which is negative for all $c_i \in [0, 5]$. Also note that $\partial\Delta\Pi_{F_2>0}/\partial c_2 = \frac{427}{1728} - \frac{5}{216}c_1 - \frac{1}{640}c_2$, which is positive for all $c_i \in [0, 5]$. That is, $\Delta\Pi_{F_2>0}$ decreases in c_1 but increases in c_2, since, at its minimum, $\Delta\Pi_{F_2>0}(c_1 = 5, c_2 = 0) = 0.415$, so $\Delta\Pi_{F_2>0} > 0$ for all $c_i \in [0, 5]$. Therefore, firm 1 chooses Case C over Case A and therefore, given $F_2 > 0$, its optimal decision is to lobby government 2.

If $F_1 > 0$, then, by symmetry, the same proof will show that firm 2's optimal decision is to lobby government 1. Thus, both firms lobbying the foreign governments (Case C) is an equilibrium for all $c_i \in [0, 5]$.

(ii) Suppose that $D_2 > 0$. Then, firm 1's lobbying position is determined by the sign of $\Delta\Pi_{D_2>0}$. Note that $\partial\Delta\Pi_{D_2>0}/\partial c_1 = -\frac{61}{270} - \frac{23}{450}c_1 - \frac{19}{108}c_2 < 0$ and $\partial\Delta\Pi_{D_2>0}/\partial c_2 = -\frac{1309}{1620} - \frac{19}{108}c_1 - \frac{1541}{16200}c_2 < 0$, for all $c_i \in [0, 5]$. That is, $\Delta\Pi_{D_2>0}$ is decreasing in both c_1 and c_2. Also note that $\Delta\Pi_{D_2>0}(c_1 = 0, c_2 = 4.95) \approx 0$ and $\Delta\Pi_{D_2>0}(c_1 = 5, c_2 = 1.22) \approx 0$. Then, for all (c_1, c_2) satisfying $\Delta\Pi_{D_2>0} = 0$, we can define the locus R_1R_1 as depicted in Figure A1. Above (below) R_1R_1, $\Delta\Pi_{D_2>0} < 0\,(> 0)$ and, given $D_2 > 0$, firm 1's optimal decision is therefore to lobby government 1 (government 2).

If $D_1 > 0$, by symmetry, we can derive $\Delta\Pi_{D_1>0}$ (corresponding to $\Delta\Pi_{D_2>0}$) and obtain the curve R_2R_2 (similarly derived as R_1R_1) to determine firm 2's lobbying position. Above (below) R_2R_2, $\Delta\Pi_{D_1>0} < 0\,(> 0)$ and firm 2's optimal decision is therefore to lobby government 2 (government 1) given $D_1 > 0$.

With these two curves, we are ready to derive the equilibrium. These curves partition the cost space into four regions. We derive the equilibrium for each region. First, suppose the two firms' costs are represented by a point, like X, which is above the two curves. Because $\Delta\Pi_{D_1>0} < 0$ and $\Delta\Pi_{D_2>0} < 0$ for both firms, given the other firm lobbying its domestic government, it is optimal for a firm to lobby its domestic government as well. Hence, both firms taking the protectionist lobbying position is an equilibrium in this region.

Suppose that the costs are in the region of point Y, which is below R_1R_1 but above R_2R_2. Then, if $D_2 > 0$, it is optimal for firm 1 to lobby government 2 (the point is below R_1R_1); but if firm 1 lobbies government 2, then from the proof in (i), we know that it is optimal for firm 2 to lobby government 1; but if firm 2 lobbies government 1, again from

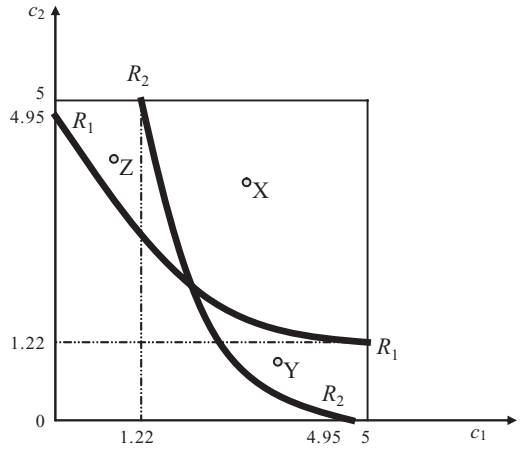

Figure A1. Best Responses

the proof in (i), we know that firm 1's best choice is to lobby government 2. Hence, the equilibrium is both firms lobbying the foreign governments.

The same analysis applies to the case when the costs are in the region of point Z, which is above R_1R_1 but below R_2R_2. The equilibrium in this region is that both firms lobby the foreign governments.

In the final region where the cost-coordinators are below both R_1R_1 and R_2R_2, the same analysis as in the Y-region and the Z-region applies and the equilibrium in this region is thus that both firms lobby the foreign governments.

In summary, both firms lobbying the foreign governments for free trade is always an equilibrium for all cost combinations; but both firms lobbying their domestic governments for protection is also an equilibrium when their costs are high such as those in the X-region of Figure A1, which is depicted as the shaded area in Figure 1. □

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Notes

1. See Rodrik (1995) and Helpman (1997) for surveys of the literature on the political economy of trade policy.
2. Recently, Qiu (2004) considered lobbying by firms in this situation. A firm may lobby for protection or for joining a free-trade agreement. However, Qiu did not allow the firm's lobbying position to be endogenously determined.
3. Hillman et al. (2001) analyze lobbying by oligopolists, but their focus is on the firms' resource allocations between lobbying and internal control.
4. Usually a firm does not lobby the foreign government directly, but indirectly via the domestic government or law or other firms in the foreign country. In this paper, we take a short-cut to allow a firm to lobby the foreign government directly. Later in the paper, I assume that the effectiveness of lobbying a foreign government is lower than that of lobbying a domestic government. We can view this as the result of an efficiency loss from foreign lobbying via foreign lobbying firms.
5. We omit a discussion of the second-order conditions and stability conditions in all cases. Under our parameter specification, all these conditions are satisfied.
6. This condition is obtained from imposing the non-negative restriction on the market equilibrium output: $x_{ii} = (a - 2c_i + c_j + t_i)/3$ and $x_{ij} = (a - 2c_i + c_j - 2t_j)/3$.