

A Comparison of Optimal Tariffs and Welfare under No Lobbying, Domestic Lobbying, and Domestic-foreign

Lobbying

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Abstract: Whether and what type of the lobbying-induced trade policies can improve the domestic welfare? We show that as compared to the case of no lobbying and the case of domestic lobbying, the domestic-foreign lobbying achieves the lowest tariff and may also realize the highest welfare for the domestic country. Our results suggest that the domestic-foreign lobbying may contribute to a freer trade in the domestic country, and lobbying competition may be one of the strongest forces pushing for trade liberalization.

Keywords: Tariff; Welfare; Political contribution; Domestic-foreign lobbying; Domestic lobbying

JEL classification code: D72; F12; F13

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A Comparison of Optimal Tariffs and Welfare under No Lobbying, Domestic Lobbying, and Domestic-foreign Lobbying

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1. Introduction

In recent years, lobbying as a common phenomenon plays an important role in influencing the trade policy making. For instance, in 2009, more than 580 principals from some 137 countries participate in lobbying the US policy makers, with the total spending in lobbying exceeding 484 million dollars. In 2009, Toyota spent about 5.2 million dollars in lobbying the US government, which is seven times more than its 1999 lobbying expenditure. Tata Consultancy Services and USINPAC from India and Lenovo, Huawei and Haier from China also lobby the US government for their benefits. Among these, the domestic firms in USA lobby the US government more frequently. Google's lobbying expenditure in 2009 is \$4.03 million, up by 44% as compared to 2008. Microsoft, HP, Tyco Electronics and MOTOROLA are also active lobbyists. The prevalent lobbying activities have aroused great interests of many scholars, and numerous related literatures emerged concerning the effect of lobbying on trade policy.

Though the literatures dealing with the lobbying behavior from the domestic firms have been abundant ever since Grossman and Helpman (1994),¹ papers concerning foreign lobbying in determining trade policy making have been relatively few, and most of them are empirical studies. For example, Mitchell (1995) found that from 1987 to 1988, the political contribution from foreign lobbying accounted for 5.6% of the total corporate political contribution, and the lobbying of foreign firms is as intensive as that of domestic firms. Gawande, Krishna and Robbins (2006) found that foreign lobbying on average decreases the Most-Favored-Nation tariff applied by the United States, and they also shown that foreign firms' lobbying to reduce the MFN

¹ See Dixit, Grossman and Helpman (2001) for an excellent survey.

tariff is still effective while the domestic firms lobby the government to increase the tariff. Americas, Kee, Olarreaga and Silva (2007) found that foreign lobbying power would significantly influence the preferential market access granted by US. In fact, Silva (2011) found that the lobbying of Latin American exporters and US importers plays an important role on determining the preferential market access granted by US.

In international trade, the major goal of foreign lobbying is to push for freer trade policy, such as cutting the tariff, while the domestic firms aim to derive the government's trade protection. If the trade policy is affected by both foreign and domestic lobbying, then we wonder whether and what type of the lobbying-induced trade policy can improve the domestic welfare. To this end, we construct a differentiated duopoly model and conduct a comparison of the optimal tariff choices and welfare consequences under three different scenarios: no lobbying, domestic lobbying, i.e., only domestic firms participate in lobbying the domestic government, and domestic-foreign lobbying, i.e., both domestic and foreign firms are active and compete with each other in lobbying the government.

We find the following results: as compared to the case of no lobbying and the case of domestic lobbying, the domestic-foreign lobbying achieves the lowest tariff and may also realize the highest welfare for the domestic country, if the relative effectiveness of foreign lobbying is high enough. In addition, if the relative effectiveness of foreign lobbying is high enough, the welfare under domestic-foreign lobbying achieves the greatest social welfare, but if the relative effectiveness is relatively low, the welfare under the domestic-foreign lobbying would be lower than that under social optimum, when the government is not sufficiently avaricious, or when the product differentiation between the goods of the two firms is sufficiently

small. Moreover, the welfare under domestic-foreign lobbying is always greater than that under the scenario of only domestic lobbying.

Our results imply that generally the domestic-foreign lobbying contributes to a freer trade in the domestic country, and lobbying competition may be one of the strongest forces pushing for trade liberalization when the relative lobbying effectiveness of foreign firm is high enough.

Our model has the structure of a common agency problem: to induce government (a common agent) to act on their behalf, firms (principals) offer the government payment schedules, which link non-negative transfers to each action the government might take. Foreign firms lobby for free trade of exports, whereas import-competing domestic firms lobby for protection from imports. Our approach draws on Bernheim and Whinston (1986) and Dixit et al. (1997), who characterize the equilibrium for a class of common agency problems. The approach has been largely applied to examine lobbying behaviours of domestic p_d and p_f denote the prices of the goods X and Y in the domestic market, respectively, and the subscripts d and f denote the domestic firm and foreign firm, respectively.

From (2.2) and (2.3), we can derive the two firms' profit functions, respectively:

$$\pi_d = p_d * x = (a - x - by)x , \quad (2.4)$$

$$\pi_f = p_f * y - ty = (a - y - bx - t)y . \quad (2.5)$$

In the absence of lobbying (called no lobbying case hereinafter), we define the domestic social welfare function as the sum of the domestic firm's profit, consumer surplus and the tariff revenue:

$$W^0 = \pi_d + CS + ty = U(x, y) - p_f y + ty . \quad (2.6)$$

Now let us consider the political market. Firms lobby to gain or retain a comparative advantage over their business rivals or to avoid a comparative disadvantage (Reich 2007). The tariff is determined through the interaction between the two firms and government. The domestic and foreign firms offer a contribution schedule $C_i(t)$, where $i=d, f$, and $C_i(t) \geq 0$, to influence the government's policy decision. The contribution schedules are assumed differentiable. Clearly, the domestic firm aims to increase the tariff imposed on foreign firm while the foreign firm's strategic goal is the opposite. The resulting payoffs for the firms are:

$$\pi_d' = \pi_d - C_d, \quad (2.7)$$

$$\pi_f' = \pi_f - C_f. \quad (2.8)$$

On the other hand, there is a self-interested incumbent government in the domestic country. In order to win the election, the government will set the tariff to maximize the number of votes obtained. Since the vote depends on the public endorsement and campaign funds, the government cares about not only the political contributions received from the domestic and foreign firms, but also the level of net social welfare in the domestic market. It should be noted that in the presence of lobbying, part of the contributions from the foreign firm enter the domestic country and become part of domestic social welfare. Hence, we specify the government's objective function as follows:

$$G(t) = W^* + \theta(C_d + \alpha C_f) = \pi_d - C_d + CS + ty + (1 + \theta)(C_d + \alpha C_f), \quad \theta \geq 0. \quad (2.9)$$

² As in Grossman and Helpman (1994), we assume that the government value a dollar in their hands more highly than in the hands of a firm, with the additional weight captured by θ . Note also that our definition of domestic post-lobbying social welfare differs from that in Konishi, Saggi and Weber (1999), which is given by $G = W^0 + \theta(C_1 + C_2) = \pi_d - C_1 + CS + ty + (1 + \theta)C_1 + \theta C_2$, $\theta \geq 0$, i.e., they attached different weights to the

Where $W^* = \pi_d - C_d + CS + ty + C_d + \alpha C_f = W^0 + \alpha C_f$, α represents the discount on the foreign contribution, alternatively, α can also be viewed as the relative effectiveness of foreign lobbying compared with domestic lobbying, in this paper we assume $\alpha < 0.9$, and θ denotes the weights that the government attaches to the political contributions from the two firms. We assume that θ is non-negative, because what we consider is the situation under which the government needs the political contribution to win the election.

Given the firms' contribution schedules, the government chooses tariff t to maximize its objective function. It should be noted that there are four cases: (i) both firms do not lobby the government; (ii) only the domestic firm lobbies the government; (iii) only the foreign firm lobbies the government³; (iv) both firms lobby the government. Clearly, in case (i), the domestic government's objective function will be reduced to (2.6), and we denote the optimal tariff chosen by the government in this case by t_0 and call it the no lobbying case. In case (ii), the objective function of the government will be reduced to

$$G(t) = W^0 + \theta C_d = \pi_d - C_d + CS + ty + (1 + \theta)C_d, \theta \geq 0, \quad (2.10)$$

and we denote the optimal tariff chosen by the government in this case by t_p and call it the domestic lobbying case. In case (iii), the objective function of the government will be:

$$G(t) = W^0 + \alpha C_f + \theta(\alpha C_f) = \pi_d - C_d + CS + ty + C_d + (1 + \theta)\alpha C_f, \theta \geq 0, \quad (2.11)$$

contributions from the domestic and foreign firms, with the weight $1 + \theta$ to the contributions from the domestic firm and the weight θ to the foreign firm.

³ This situation rarely happens in reality, we consider it to calculate the t_q to derive C_d .

we denote the optimal tariff of the government in this case by t_q and call it the foreign lobbying case. In case (iv), the objective function of the government is (2.9), and we denote the optimal tariff by t_b and call it domestic-foreign lobbying case.

Our model can have multiple sub-game perfect Nash equilibria. In the following analysis, we restrict our focus to the truthful Nash equilibrium, supported by truthful contribution functions that everywhere reflect the true preferences of the two firms. A truthful contribution function for firm i , $i = d, f$, rewards the government for every change in the action by exactly the amount of change in the firm's payoff, provided that the payment both before and after the change is strictly positive (Dixit, Grossman and Helpman 1997). We denote the truthful contribution functions of the two firms respectively by

$$C_d^T(t) = \max \{0, \pi_d(t) - \pi_d(t_q)\} \quad (2.12)$$

and

$$C_f^T(t) = \max \{0, \pi_f(t) - \pi_f(t_p)\}, \quad (2.13)$$

where t_q is the optimal tariff chosen by the government in the foreign firm lobbying case. Thus, $\pi_d(t_q)$ is the reservation payoff of the domestic firm, and $\pi_f(t_p)$ is similarly defined and represents the reservation payoff of the foreign firm.

We then consider a simple three-stage game. In stage one, the two firms simultaneously provide the government their campaign contribution schedules. In stage two, the government sets the tariff imposed on the foreign firm. In stage three, both firms compete in the domestic market à la Bertrand (resp. Cournot), and they choose their strategic variables (prices or outputs) according to the tariff level. Backward induction method is adopted to solve this game.

3. Tariff Comparisons under Differentiated Bertrand Duopoly

We consider the differentiated Bertrand competition in this section, i.e., in the third stage, the two firms engage in price competition. We restrict our discussion to interior solutions. Thus, we assume that $0 < \theta < 0.25$ under Bertrand duopoly. We first consider the third stage. By calculating the first-order conditions of the two firms, we derive the following Bertrand equilibrium prices:

$$p_d = \frac{2a - ab - ab^2 + bt}{4 - b^2}, \quad (3.1)$$

$$p_f = \frac{2a - ab - ab^2 - 2t}{4 - b^2}. \quad (3.2)$$

Thus, the corresponding outputs of the two firms are:

$$x = \frac{2a - ab - ab^2 + bt}{(4 - b^2)(1 - b^2)}, \quad (3.3)$$

$$y = \frac{2a - ab - ab^2 - 2t + b^2t}{(4 - b^2)(1 - b^2)}. \quad (3.4)$$

The equilibrium profits of the two firms are given by:

$$\pi_d = \frac{(2a - ab - ab^2 + bt)^2}{(4 - b^2)^2(1 - b^2)}, \quad (3.5)$$

$$\pi_f = \frac{[a(2 - b - b^2) - 2t + b^2t]^2}{(4 - b^2)^2(1 - b^2)}. \quad (3.6)$$

It is straightforward to show that

$$\frac{\partial \pi_d}{\partial t} = \frac{2b(2a - ab - ab^2 + bt)}{(4 - b^2)^2(1 - b^2)} > 0, \quad (3.7)$$

$$\frac{\partial \pi_f}{\partial t} = -\frac{(2 - b^2)[a(2 - b - b^2)a + (2 - b^2)t]}{(4 - b^2)^2(1 - b^2)} < 0. \quad (3.8)$$

(3.7) and (3.8) imply that the higher the tariff is, the higher the profit of the domestic firm is, and the lower the profit of the foreign firm is, i.e., the two firms' interests over tariff conflict with each other.

Substituting (3.1)-(3.6) into (2.6), we get the social welfare function of the domestic country in the case of no lobbying and that under the domestic lobbying:

$$W^0 = \frac{2\alpha^2(2-b-b^2)+2\alpha(1-b^2)t-(3-2b^2)t^2}{2(4-5b^2+b^4)}. \quad (3.9)$$

And we also get the corresponding social welfare function in the case of domestic-foreign lobbying:

$$w^* = \frac{2\alpha^2(2-b-b^2)+2\alpha(1-b^2)t-(3-2b^2)t^2}{2(4-5b^2+b^4)} + \alpha(C_f^T). \quad (3.10)$$

In the second stage, the domestic government will set the tariff imposed on the foreign firm. And there are four cases:

Firstly, if there is no political contributions, i.e., the no lobbying case. The government will set the tariff to maximize the social welfare function specified in (2.6), i.e., $dW^0/dt = 0$, from which we derive t_0 :

$$t_0 = \frac{\alpha(1-b^2)}{3-2b^2} > 0. \quad (3.11)$$

Then we consider the domestic lobbying case. Given the government's possible reaction, the domestic firm will provide the government a campaign contribution schedule. The domestic firm confronts the following constraint:

$$W^0(t) + \theta C_d^T \geq W^0(t_0) \quad (3.12)$$

(3.12) means that the domestic firm must guarantee the government the utility level that it could attain without any contribution to persuade the government to accept its contribution schedule. Since the domestic firm will try to make its contribution as

small as possible, this inequality must be binding. Thus, the domestic firm will maximize

$$\pi_d - \frac{W^0(t_0) - W^0(t)}{\theta}, \quad (3.13)$$

Therefore, in equilibrium, the optimal tariff level must satisfy

$$\frac{dW^0(t)}{dt} + \theta \frac{d\pi_d(t)}{dt} = 0. \quad (3.14)$$

From (3.14), we can derive the optimum tariff t_0 in the domestic lobbying case:

$$t_p = \frac{a(2-b-b^2)(2-b^2+b(1+2\theta))}{12+2b^4-b^2(11+2\theta)} \quad (3.15)$$

Thirdly, in the foreign lobbying case, the incumbent government will choose tariff to maximize (2.11), so the optimal tariff of the government must satisfy

$$\frac{dW^*(t)}{dt} + \alpha\theta \frac{d\pi_f(t)}{dt} = 0. \quad (3.16)$$

From (3.16), we derive the optimal tariff t_q in the foreign lobbying case:

$$t_q = \frac{\alpha(b-1)(b+2)(2+b-4\alpha(1+\theta)+b^2(-1+2\alpha(1+\theta)))}{-12+8\alpha(1+\theta)+2b^4(-1+\alpha+\alpha\theta)+b^2(11-8\alpha(1+\theta))} \quad (3.15)$$

Finally, we move on to consider the domestic-foreign lobbying scenario, i.e. both firms lobby the government simultaneously. Similarly, given the possible reaction of government, the domestic and foreign firms provide the government campaign contribution schedules. Both firms confront the following constraints:

$$W^*(t) + \theta(C_d^T + \alpha C_f^T) \geq W^0(t_0) \quad (3.17)$$

Since both firms will try to make their contribution as small as possible, this inequality must be binding, i.e. the contribution schedules provided by two firms must maximize the following equation:

$$(\pi_d + \alpha\pi_f) - \frac{W^0(t_0) - W^*(t)}{\theta}. \quad (3.18)$$

Therefore, the optimal tariff level must satisfy:

$$\frac{dW^*(t)}{dt} + \theta \frac{d\pi_d(t)}{dt} + \alpha\theta \frac{d\pi_f(t)}{dt} = 0. \quad (3.19)$$

Otherwise, both firms will have incentives to modify the schedules.

From (3.19), we can derive the optimum tariff t_b :

$$t_b = \frac{\alpha(b-1)(b+2)(2+b+2b\theta-4\alpha(1+\theta)+b^2(-1+2\alpha(1+\theta)))}{-12+8\alpha(1+\theta)+2b^4(-1+\alpha+\alpha\theta)+b^2(11+2\theta-8\alpha(1+\theta))}. \quad (3.20)$$

Now we can calculate $\pi_d(t_p)$ and $\pi_f(t_q)$ and substitute them into (2.11) and (2.12), respectively, we get

$$C_d^r(t) = -\frac{(-2a+ab+ab^2-bt)^2}{(-4+b^2)^2(-1+b^2)} + \frac{a^2(-1+b)(-2+b^2)^2(-3+2\alpha(1+\theta)+2b(-1+\alpha+\alpha\theta))^2}{(1+b)(-12+8\alpha(1+\theta)+2b^4(-1+\alpha+\alpha\theta)+b^2(11-8\alpha(1+\theta)))^2}, \quad (3.21)$$

$$C_f^r(t) = -\frac{(-a(-2+b+b^2)-2t+b^2t)^2}{(-4+b^2)^2(-1+b^2)} + \frac{a^2(-1+b)(-4+b^3+b(-1+2\theta)+b^2(3+2\theta))^2}{(1+b)(12+2b^4-b^2(11+2\theta))^2}. \quad (3.22)$$

Substitute (3.11) into (2.10), we get the social welfare function in the case of domestic-foreign lobbying:

$$w^* = \frac{2a^2(2-b-b^2)+2a(1-b^2)t-(3-2b^2)t^2}{2(4-5b^2+b^4)} + \alpha \left(-\frac{(-a(-2+b+b^2)-2t+b^2t)^2}{(-4+b^2)^2(-1+b^2)} + \frac{a^2(-1+b)(-4+b^3+b(-1+2\theta)+b^2(3+2\theta))^2}{(1+b)(12+2b^4-b^2(11+2\theta))^2} \right). \quad (3.23)$$

Now we compare t_0 , t_p and t_b .

Firstly, we compare the t_0 and t_p :

$$t_p - t_0 = -\frac{2ab(6 - 2b - 7b^2 + b^3 + 2b^4)\theta}{(-3 + 2b^2)(12 + 2b^4 - b^2(11 + 2\theta))}. \quad (3.24)$$

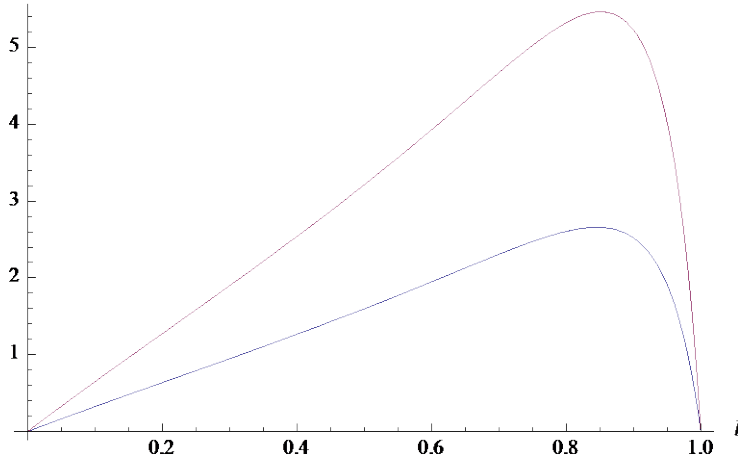


Figure 1: $t_p - t_0$

Note: the blue curve denotes the $t_p - t_0$ when $\theta = 1/8$, while the red curve denotes the $t_p - t_0$ when $\theta = 1/4$.

Obviously, when $0 < b < 1$, (3.24) is larger than zero, which immediately implies that $t_0 < t_p$. This result demonstrates that when goods X and Y are substitutes, the social optimal tariff is lower than that under the scenario of domestic lobbying. The intuition behind is simple: when goods X and Y are substitutes, the import of Y will lower the output of good X. Since the domestic firm is the only lobbyist under the scenario of domestic lobbying, its contribution inevitably pushes the government to bend the trade policy in its favor, resulting in a higher tariff than social optimum. And from figure 1, we can also notice that when b is around 0.8, the value of $t_p - t_0$ is maximal, and the difference of tariff will be larger if θ is closer to 1/4.

Secondly, we compare t_p and t_b :

$$t_p - t_b = \alpha(-1+b)(2+b) \times \left(\frac{-2+b^2-b(1+2\theta)}{12+2b^4-b^2(11+2\theta)} - \frac{2+b+2b\theta-4\alpha(1+\theta)+b^2(-1+2\alpha(1+\theta))}{-12+8\alpha(1+\theta)+2b^4(-1+\alpha+\alpha\theta)+b^2(11+2\theta-8\alpha(1+\theta))} \right) \quad (3.25)$$

From the above equation, we can derive that when $0 < b < 1$, (3.25) is always larger than zero, which immediately implies that $t_p > t_b$. This result demonstrates that when goods X and Y are substitutes, the tariff under domestic lobbying case is higher than that under the scenario of domestic-foreign lobbying. Also the tariff difference increases as the decrease of b and the rise of θ .

We then move on to compare t_0 and t_b :

$$t_b - t_0 = -\frac{\alpha(-1+b^2)}{-3+2b^2} + \frac{\alpha(-1+b)(2+b)(2+b+2b\theta-4\alpha(1+\theta)+b^2(-1+2\alpha(1+\theta)))}{-12+8\alpha(1+\theta)+2b^4(-1+\alpha+\alpha\theta)+b^2(11+2\theta-8\alpha(1+\theta))} \quad (3.26)$$

By observing the three-dimension figure of $t_b - t_0$, since $0 < b < 1$, we observe that when $0.85 \leq \alpha < 0.9$, (3.26) is always smaller than zero, which immediately implies that $t_b < t_0$. That is, when goods X and Y are substitutes, the social optimal tariff is greater than that under the domestic-foreign lobbying scenario, the intuition is simple: under the assumption of truthful Nash equilibrium, in an effort to maximize firm contributions, policy makers choose to increase the profitability of the firm that is perceived to be more profitable by bending trade policy in its favor. Since the two firms' marginal costs are the same, the government clearly perceives the foreign firm to be more profitable than its domestic counterpart as the foreign firm's contribution, being a net transfer of income to the domestic country, are attached a heavier weight, resulting in a lower tariff than that under social optimum. However, when $0 \leq \alpha < 0.85$, it is possible that t_b is larger than t_0 when b and θ are relatively large.

And the positive range of $t_b - t_0$ expands with the decrease of α . This implies that if the discount of foreign contribution is high or the foreign lobbying has relatively poor effectiveness, the possibility for foreign lobbyist to obtain tariff that is lower than social optimum tariff is small.

In sum, when $0.85 \leq \alpha \leq 0.9$, we have $t_b < t_0 < t_p$. Hence, lobbying competition between the domestic and the foreign firms contributes to freer trade under the differentiated Bertrand competition. On the other hand, when $0 \leq \alpha < 0.85$, t_b is possibly larger than t_0 , and when b and θ are relatively high. Does this result hold when the firms engage in quantity competition? In the following section, we will examine this question.

4. Tariff Comparisons under Differentiated Cournot Duopoly

In this section, we discuss the differentiated Bertrand competition, i.e., in the third stage, the two firms engage in quantity competition. To ensure the existence of interior solutions, we assume that $0 < \theta < 0.1$ under Cournot duopoly. We can derive the following Cournot equilibrium outputs:

$$x = \frac{2a - ab + bt}{4 - b^2}, \quad (4.1)$$

$$y = \frac{2a - ab - 2t}{4 - b^2}. \quad (4.2)$$

Further, we can derive the equilibrium profits of the two firms:

$$\pi_d = \frac{[a(2 - b) + bt]^2}{(4 - b^2)^2}, \quad (4.3)$$

$$\pi_f = \frac{[a(2 - b) - 2t]^2}{(4 - b^2)^2}. \quad (4.4)$$

Differentiate (4.3) and (4.4) with respect to t , respectively:

$$\frac{\partial \pi_d}{\partial t} = \frac{2b[a(2-b) + bt]^2}{(4-b^2)^2} > 0, \quad (4.5)$$

$$\frac{\partial \pi_f}{\partial t} = -\frac{4[a(2-b) - 2t]}{(4-b^2)^2} < 0. \quad (4.6)$$

Similar to the Bertrand case, (4.5) and (4.6) imply that the higher the tariff is, the higher the profit of the domestic firm is, and the lower the profit of the foreign firm is. In other words, the lobbying target of the domestic firm is to increase the tariff, while that of the foreign firm is opposite.

Substituting (4.1)-(4.4) into (2.6), we get the social welfare function of the domestic country in the case of no lobbying and that under the domestic lobbying:

$$W^0 = \frac{2a^2(2-b) + 2at - 3t^2}{2(4-b^2)}. \quad (4.7)$$

With (4.7), we can also get the corresponding social welfare function in the case of domestic-foreign lobbying:

$$W^* = \frac{2a^2(2-b) + 2at - 3t^2}{2(4-b^2)} + (C_f^t). \quad (4.8)$$

By using the same method as in Section 3, we calculate the corresponding t_0 , t_p and t_b under differentiated Cournot competition. They denote the social optimal tariff, tariff under the domestic lobbying and tariff under the domestic-foreign lobbying, respectively:

$$t_0 = \frac{a}{3}, \quad (4.9)$$

$$t_p = \frac{a(2-b)(2+b+2b\theta)}{12-b^2(3+2\theta)}, \quad (4.10)$$

$$t_b = \frac{(2-b)^2(a+2a\theta)}{-4+8\theta+b^2(3+2\theta)}. \quad (4.11)$$

Now we can calculate $\pi_d(t_p)$ and $\pi_f(t_q)$ and substitute them into (2.11) and (2.12), respectively, we get

$$C_d^r(t) = \frac{((a(-2+b)-bt)^2 - 4a^2(-4+b^2)^2(-3+b+2\alpha(1+\theta))^2)}{(-12+3b^2+8\alpha(1+\theta))^2} \cdot \frac{1}{(-4+b^2)^2}, \quad (4.12)$$

$$C_f^r(t) = \frac{(a(-2+b)+2t)^2 - a^2(-4+b^2)^2(-4+b(3+2\theta))^2}{(-12+b^2(3+2\theta))^2} \cdot \frac{1}{(-4+b^2)^2}. \quad (4.13)$$

Substitute (4.13) into (4.8), we get the corresponding social welfare function in the case of domestic-foreign lobbying

$$W^* = \frac{2a^2(2-b)+2at-3t^2}{2(4-b^2)} + \left(\frac{(a(-2+b)+2t)^2 - a^2(-4+b^2)^2(-4+b(3+2\theta))^2}{(-12+b^2(3+2\theta))^2} \cdot \frac{1}{(-4+b^2)^2} \right). \quad (4.14)$$

Now we can compare t_0 , t_p and t_b .

We first compare t_0 and t_p :

$$t_p - t_0 = \frac{4a(-3+b)b\theta}{-36+b^2(9+6\theta)}. \quad (4.15)$$

Clearly, as long as $0 < b < 1$, (4.15) is always larger than zero, which immediately implies that $t_0 < t_p$. This result is the same as that under differentiated Bertrand competition, i.e., when goods X and Y are substitutes, the social optimal tariff is lower than that under the domestic lobbying scenario, irrespective of the competition types.

Then we compare t_p and t_b :

$$t_p - t_b = \frac{4a(-4+b^2)\alpha(1+\theta)(-4+b(3+2\theta))}{(-12+b^2(3+2\theta))(-12+8\alpha(1+\theta)+b^2(3+2\theta))}. \quad (4.16)$$

Similar to the Bertrand case, we can derive that when $0 < b < 1$, (4.16) is always larger than zero, i.e., $t_p > t_b$. This demonstrates that when goods X and Y are

substitutes, the tariff under domestic lobbying case is higher than that under the scenario of domestic-foreign lobbying. Also the tariff difference increases as the decrease of b and the rise of θ .

Finally, we move on to compare t_0 and t_b . It can be shown that

$$t_b - t_0 = \frac{4\alpha((-3+b)b\theta - (-4+3b)\alpha(1+\theta))}{3(-12+8\alpha(1+\theta)+b^2(3+2\theta))}. \quad (4.17)$$

By observing the three-dimension figure of $t_b - t_0$, we find that when $0.18 \leq \alpha \leq 0.9$, and $0 < b < 1$, (4.17) is smaller than zero, which implies that $t_b < t_0$. That is, when goods X and Y are substitutes, the social optimal tariff is greater than that under the domestic-foreign lobbying scenario. However, When $0 \leq \alpha < 0.18$, it is possible that t_b is larger than t_0 when b and θ are relatively large. And the positive range of $t_b - t_0$ expands with the decrease of α . This implies that if the discount of foreign contribution is high (even higher than the Bertrand case) or the foreign lobbying has relatively poor effectiveness, the possibility for foreign lobbyist to obtain tariff that is lower than social optimum tariff is small.

In sum, when $0.18 \leq \alpha \leq 0.9$, we have $t_b < t_0 < t_p$. Hence, lobbying competition between the domestic and the foreign firms also contributes to freer trade under differentiated Cournot competition. The intuition behind is similar to that under Bertrand competition and we will not dwell on it any more. However, when $0 \leq \alpha < 0.18$, t_b is possibly larger than t_0 when b and θ are relatively high. We can see that the critical value of α is lower in the Cournot case, since the competition in Bertrand case is fiercer.

Based on the analysis in Sections 3 and 4, we have the following proposition:

Proposition 1: *When goods X and Y are substitutes, i.e., $0 < b < 1$, irrespective of the competition types, the tariff under the scenario of domestic lobbying is always higher than the social optimal tariff, and when $0.85 \leq \alpha \leq 0.9$ in the Bertrand case ($0.18 \leq \alpha \leq 0.9$ in the Cournot case), the optimal tariff is always higher than the tariff under the scenario of the domestic-foreign lobbying, i.e., $t_b < t_0 < t_p$. However, when $0 \leq \alpha \leq 0.85$ in the Bertrand case ($0 \leq \alpha \leq 0.18$ in the Cournot case), t_b is possibly larger than t_0 when b and θ are relatively high.*

Proposition 1 implies that if the relative lobbying effectiveness of foreign firm is high enough, lobbying competition between the domestic and foreign firms, i.e., the domestic-foreign lobbying, contributes to freer trade in the domestic country.

5. Social Welfare Comparisons

In this section, we will compare the corresponding social welfares under the following three scenarios: the social optimum case, the domestic lobbying case and the domestic-foreign lobbying case. As before, we will first conduct our comparisons under differentiated Bertrand competition, and then we move on to consider the differentiated Cournot case.

5.1 Bertrand duopoly

We first compare the welfare under social optimum and that under the domestic lobbying. From (3.9), (3.11) and (3.15), it is not difficult to show that

$$W^0(t_p) - W^0(t_0) = \frac{2\alpha^2(-1+b)b^2(6+4b-3b^2-2b^3)^2\theta^2}{(12+12b-11b^2-11b^3+2b^4+2b^5)(12+2b^4-b^2(11+2\theta))^2}$$

(5.1.1)

From the three-dimension figure of $W^0(t_p) - W^0(t_0)$, we can find that $W^0(t_p)$ is always lower than $W^0(t_0)$, this result is obvious, since t_0 is the social optimal tariff, any deviation from this tariff level is clearly not optimal. Moreover, when $0.7 \leq b \leq 1$ and $0.2 \leq \theta \leq 0.25$, the welfare difference reaches its maximum.

We then proceed to compare the welfare under social optimum and that under the domestic-foreign lobbying. Noting that under the current model setting, we assume that $0 < b < 1$, $0 < \alpha < 0.9$ and $0 < \theta < 0.25$.

$$W^*(t_b) - W^0(t_0) = . \quad (5.1.2)$$

From the three-dimension figure of $W^*(t_b) - W^0(t_0)$, we can find that, when $0.73 < \alpha \leq 0.92$, we always have $W^*(t_b) > W^0(t_0)$. However, when $0 < \alpha \leq 0.73$, $W^*(t_b)$ is not always greater than $W^0(t_0)$, we notice that when the government is sufficiently avaricious, i.e., θ is sufficiently large, and the product differentiation between the goods of the two firms is relatively large, we have $W^*(t_b) < W^0(t_0)$. Moreover, with an increase in b , θ need to be larger to maintain the relationship $W^*(t_b) < W^0(t_0)$.

Now we move on to compare the welfare under the domestic lobbying and that under the domestic-foreign lobbying.

Similarly, we assume that $0 < b < 1$, $0 < \alpha < 0.9$ and $0 < \theta < 0.25$.

$$W^*(t_b) - W^0(t_p) = .$$

The three-dimension figure of $W^*(t_b) - W^0(t_p)$ shows that in all cases, $W^*(t_b)$ is greater than $W^0(t_p)$. This implies that it is preferable for the domestic country to have domestic-foreign lobbying than only domestic lobbying.

From the above analysis, we have established the following proposition:

Proposition 2: *When the domestic and foreign firms engage in Bertrand competition, the welfare under the domestic lobbying is always lower than that under social optimum, i.e., $W^0(t_0) > W^0(t_p)$. Moreover, if $0.73 < \alpha \leq 0.9$, $W^*(t_b)$ is always greater than $W^0(t_0)$, however, if $0 < \alpha \leq 0.73$, the welfare under the domestic-foreign lobbying would be less than that under social optimum, i.e., $W^*(t_b) < W^0(t_0)$, when the government is not sufficiently avaricious, or when the product differentiation between the goods of the two firms is sufficiently small. Moreover, $W^*(t_b)$ is always greater than $W^0(t_p)$.*

5.2 Cournot duopoly

As in Section 5.1, we first compare the optimal social welfare and that under the domestic lobbying:

$$w^0(t_p) - w^0(t_0) = \frac{8a^2(-3+b)^2b^2\theta^2}{3(-4+b^2)(-12+b^2(3+2\theta))^2}. \quad (5.2.1)$$

We can see that $w^0(t_p)$ is always lower than $w^0(t_0)$, which is the same as the Bertrand case.

Then we move on to compare the welfare under social optimum and that under the domestic-foreign lobbying.

Recall the assumptions of $0 < b < 1$, $0 < \alpha < 0.9$ and $0 < \theta < 0.1$ for the Cournot case. We have:

$$W^*(t_b) - W^0(t_0) =$$

From the three-dimension figure of $W^*(t_b) - W^0(t_0)$, we can find that, when $0.1 < \alpha \leq 0.9$, we always have $W^*(t_b) > W^0(t_0)$. However, when $0 < \alpha \leq 0.1$, $W^*(t_b)$ is not invariably greater than $W^0(t_0)$, we notice that when the government is sufficiently avaricious, i.e., θ is sufficiently large, and the product differentiation between the goods of the two firms is relatively large, we have $W^*(t_b) < W^0(t_0)$. Moreover, with an increase in b , θ need to be larger to maintain the relationship $W^*(t_b) < W^0(t_0)$, this conclusion is similar to the Bertrand case, except the critical value of α is different in two cases. It indicates that the condition for holding $W^*(t_b) > W^0(t_0)$ is stricter in the Bertrand case due to the different competition of two cases.

Finally, we compare the welfare under the domestic lobbying and that under the domestic-foreign lobbying.

Similarly, we assume that $0 < b < 1$, $0 < \alpha < 0.9$ and $0 < \theta < 0.1$.

$$W^*(t_b) - W^0(t_p) = .$$

The conclusion draw from the above equation is same with the Bertrand case. $W^*(t_b)$ is greater than $W^0(t_p)$ in any case. In sum, we have the following proposition:

Proposition 3: *When the domestic and foreign firms engage in Cournot competition, the welfare under the domestic lobbying is always lower than that under social optimum, i.e., $W^0(t_0) > W^0(t_p)$. Moreover, if $0.1 < \alpha \leq 0.9$, $W^*(t_b)$ is greater than $W^0(t_0)$ in any case, however, if $0 < \alpha \leq 0.1$, the welfare under the domestic-foreign lobbying would be less than that under social optimum, i.e., $W^*(t_b) < W^0(t_0)$, when*

the government is not sufficiently avaricious, or when the product differentiation between the goods of the two firms is sufficiently small. Moreover, $W^(t_b)$ is always greater than $W^0(t_p)$.*

The difference between Proposition 2 and Proposition 3 mainly lies in the duality between Cournot and Bertrand. According to Vives (1985), the toughness of competition is fiercer under Bertrand than under Cournot competition, therefore, the range of α in which $W^*(t_b)$ is greater than $W^0(t_0)$ is larger in the Cournot case.

6. Conclusion

In this study, we find that lobbying competition between the domestic and foreign firms, in most cases, contributes to a freer trade in the domestic country. Moreover, as compared to the case of no lobbying and the case of domestic lobbying, the domestic-foreign lobbying may probably realize the highest welfare for the domestic country. In other words, lobbying competition may be one of the strongest forces pushing for trade liberalization. This happens primarily because it is easier for foreign lobbies to compensate the government for the distortions associated with changes in trade policy, as contributions from the foreign lobbies receive a heavier weight than domestic contributions.

We conclude by noting some limitations of our results. First, we have restricted our attention to tariffs in order to gauge the impact of lobbying on the political process. In the real world, the government holds a wide selection of policy tools. It is possible to examine how the optimal tariffs and the corresponding social welfare may be affected by each of these policies in the presence of lobbying. Second, our results are based on

the assumption of equal marginal costs of the two firms, which may lead to oversimplified predictions. It is interesting to take into account the cost differentials between firms.

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