

Political Economy of Strategic Trade Policy: Menu-Auctions with Imperfect Competition*

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Abstract

This paper applies the Dixit-Grossman-Helpman (1994, 1997) common agency model to investigate the formation of strategic export subsidy and strategic import tariff. The results of this paper indicate that even with political pressure, the Dixit-Grossman-Helpman politically-determined export subsidy is identical to the Brander-Spencer rent-shifting export subsidy. The politically-determined import tariff will be higher than the optimal level. This paper highlights the possibility that lobbying can restore the level of trade intervention to a more efficient one in the absence of the benevolent dictator. Joint lobbying is also considered and the results indicate that joint lobbying on export subsidy improves domestic welfare due to the elimination of the resource wasted in lobbying.

Keywords: Lobbying, Strategic Trade Policy, Imperfect Competition

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1 Introduction

This paper discusses the formation of trade policies in the presence of lobbying and imperfect competition. The production structure is as that described in the Brander-Spencer model, and the lobbying structure is similar to that in Dixit-Grossman-Helpman (1994, 1997) except that we assume lobbying on export subsidy and import tariff is independent.¹ This is the first paper that explicitly combines the Grossman-Helpman political economy framework with the Brander-Spencer rent-shifting model. As such, the paper can be called "rent-shifting trade policies for sale".

Grossman and Helpman (1994) study how sector specific lobbying influences trade policy by providing campaign contributions in a small open economy with perfect competition.² Their study has attracted a lot of attention in recent years. The great advantage of their framework is that the results of the model can be derived from the first principle of welfare maximizing functions of both the government and the interest groups.

A similar framework is also used to investigate the joint determination of product and labor market instruments by Rama and Tabellini (1998).³ Magee (1998) examines the equilibrium level of tariff and welfare in the presence of trade adjustment assistance (TAA). Konishi, Saggi, and Weber (1999) study the formation of trade policy in the presence of FDI. Up to now, *most of these previous studies under the menu-auction framework in the literature assume perfect competition.*⁴

However, it is well-known that in the presence of imperfect competition, trade

¹This assumption will not affect the results of lobbying in equilibrium.

²Grossman and Helpman (1995) also apply this framework into a two-country setting and focus on the interactions between the national negotiators who are concerned with the aggregate social welfare and campaign contributions. Dixit, Grossman and Helpman (1997) develop this menu-auction model to a general setting.

³This paper follows the denotation used in Rama and Tabellini's (1998) model which simplifies the Grossman-Helpman framework.

⁴Konishi *et al.* (1999) assume duopoly composed of a domestic firm and a foreign firm. However, the focus of their paper is different from ours.

intervention by the domestic country will increase domestic welfare by shifting some profit of foreign firms to domestic firms. Intervention of trade expands the domestic firm's market shares and profit, and besides, tariff also transfers some foreign rents to the domestic country in the form of tariff revenue.⁵ Imperfect competition thus provides a clear motivation for political interest groups to engage in lobbying.

Moore and Suranovic (1993) consider the impact of lobbying on the determination of strategic trade policy.⁶ Fung (1997) focuses on the examination of the welfare properties of tariff under both market failure and lobbying.⁷ Grossman and Maggi (1997) study the outcomes of strategic trade policy under strategic manipulation and political pressures. However, none of these studies use the menu-auction framework.

This paper re-examine the strategic trade policies in the environment of Grossman-Helpman political framework. This paper starts by identifying the gainers and the losers from lobbying at the levels of export subsidy and import tariff set by the domestic benevolent dictator. After identifying the gainers and the losers from lobbying, the optimal trade polices and the politically-determined trade polices are derived. Our central results are as follows: *the Grossman-Helpman politically-determined export subsidy is identical to the Brander-Spencer strategic export subsidy; whereas the politically-determined tariff is higher than the rent-shifting import tariff.* The results still hold after relaxing the "third market" assumption.

⁵The idea is well-analyzed in the literature of strategic trade policy. Brander and Spencer (1985) incorporate a Cournot duopoly into a "third market" model and show that the export subsidy increases domestic welfare net of the subsidy. Eaton and Grossman (1986) consider the Bertrand competition, and show that the domestic government would have the incentive to tax export which is exactly the opposite of the Brander-Spencer result. Both cases suggest that free trade is not superior from the domestic point of view.

⁶Moore and Suranovic use a general lobbying function, in which lobbying incurs real resource cost. However, under Grossman-Helpman framework, the campaign contributions are treated as net transfer within the domestic country.

⁷Fung (1997) uses a general lobbying function without further providing microfoundations for the lobbying function.

The case that two interest groups are not equally effective in influencing government policies and the case that two interest groups cooperate in lobbying are also considered in this paper. Moreover, the possibility that lobbying can restore the intervention level to a more efficient one is highlighted in this paper.

This paper is organized as follows: Section 2 lays out the basic model. In section 3, the equilibrium policies in the absence of lobbying are described and the gainers and the losers resulted from the presence of lobbying are also identified in this section. The formal lobbying structure, politically-determined policies and welfare effects in the presence of lobbying are characterized in section 4. Section 5 relaxes the third market assumption to discuss the politically-determined policies in a more general setting. Section 6 demonstrates the case that the two interest groups are not equally effective in lobbying. Section 7 discusses the equilibrium contributions provided by the interest groups. Section 8 discusses the possibility that lobbying may improve the social welfare in the case of no benevolent dictator. Section 9 evaluates the equilibrium policies and contributions for the joint lobbying. Concluding remarks are provided in the last section.

2 Formal Framework

Consider a small open economy consisting of two sectors: one formal sector and one informal sector (or alternatively, manufacturing and underground). The formal sector consists of two firms: the export competing firm produces good x for foreign market only and the import competing firm produces good y for the domestic market. The informal sector produces the numeraire good, n , with a migrant factor only. The technology for the numeraire good is constant return to scale. The goods, x and y , are produced with the migrant factor and a specific factor. The migrant factor is supplied inelastically to the domestic economy. As long as the informal sector is active, the constant marginal product of the migrant factor fixes its economy-wide return to unity.

Total population is normalized to one. A fraction α^x of the population owns

the specific factor used in the production of good x and has a direct stake in the export competing firm, a fraction α^y of the population owns the specific factor used in the production of good y and has a direct stake in the import competing firm. The remaining $1 - \alpha^x - \alpha^y$ (hereafter, α^m) individuals are the owners of the migrant factor, which are used in both formal and informal sectors, and earn a fixed return which is normalized to one. The owners of the migrant factor are assumed to be inactive politically. Each individual is allowed to own at most one specific factor. Those individuals who own the same specific factor have the same interest in trade protection (and promotion) and organize as interest groups for political activity.

2.1 Production Structure

The behavior of the manufacturing firms is modeled as a simple Nash quantity duopoly (the same as that in Brander-Spencer (1984, 1985)). This part of the model is familiar to the strategic trade policy literature, but it is useful for our expositions later in the paper. The export competing firm produces good x , and competes with the foreign firm who produces homogeneous product x^* in the foreign market. The domestic government offers the specific subsidy s to the export industry.⁸

The domestic firm maximizes profit π^x , and the foreign firm maximizes profit π^{x^*} .⁹

$$\begin{aligned}\pi^x(x, x^*; s) &= p^x(x + x^*)x - c^x(x) + sx \\ \pi^{x^*}(x, x^*; s) &= p^x(x + x^*)x^* - c^{x^*}(x^*)\end{aligned}\tag{1}$$

⁸Brander and Spencer (1984a) also consider the ad valorem tariff or subsidy, and show that the critical conditions hold in both ad valorem and specific cases for Cournot oligopoly. Eaton and Grossman (1986) consider the ad valorem case, but the structure of their results is not affected if we use the specific subsidy (see Brander and Spencer, 1995).

⁹The homogeneous goods x and x^* are only sold in the foreign market.

where c^x and c^{x^*} are the costs of the domestic firm and the foreign firm producing x and x^* , respectively; $p^x(x + x^*)$ is the inverse demand of the two homogeneous goods x and x^* in the foreign market; s is a per unit export subsidy which is treated as given.

After some algebra, we show that a higher level of domestic export subsidy lowers the product price, increases the domestic profit and decreases the foreign profit. In other words, a higher level of export subsidy increases domestic welfare at the cost of foreign country. The actual equilibrium level of export subsidy will be discussed in section 3 and section 4.

$$\begin{aligned}\frac{d\pi^x}{ds} &= \pi_x^x x_s + \pi_{x^*}^x x_s^* + \frac{\partial \pi^x}{\partial s} = \pi_{x^*}^x x_s^* + x > 0 \\ \frac{d\pi^{x^*}}{ds} &= \pi_x^{x^*} x_s + \pi_{x^*}^{x^*} x_s^* + \frac{\partial \pi^{x^*}}{\partial s} = x^* p^{x'} x_s < 0\end{aligned}$$

The import competing firm produces good y and competes with the foreign firm which produces homogeneous product y^* in the domestic market. The domestic firm maximizes profit π^y , and the foreign firm maximizes profit π^{y^*} .¹⁰

$$\begin{aligned}\pi^y(y, y^*; t) &= p^y(y + y^*)y - c^y(y) \\ \pi^{y^*}(y, y^*; t) &= p^y(y + y^*)y^* - c^{y^*}(y^*) - ty^*\end{aligned}\tag{2}$$

where c^y and c^{y^*} are the costs of the domestic firm and the foreign firm producing y and y^* , respectively; $p^y(y + y^*)$ is the inverse demand of the two homogeneous goods y and y^* in the domestic market; t is a per unit import tariff.

Similarly, we can show that higher domestic import tariff increases the profit of the domestic firm and reduces the profit of the foreign firm. The equilibrium import tariff can be either positive or negative and will be discussed in the

¹⁰The homogeneous goods y and y^* are only sold in the domestic market.

following sections.

$$\begin{aligned}\frac{d\pi^y}{dt} &= \pi_y^y y_t + \pi_{y^*}^y y_t^* + \frac{\partial \pi^y}{\partial t} = \pi_{y^*}^y y_t^* > 0 \\ \frac{d\pi^{y^*}}{dt} &= \pi_y^{y^*} y_t + \pi_{y^*}^{y^*} y_t^* + \frac{\partial \pi^{y^*}}{\partial t} = y^* p^{y'} y_t - y < 0\end{aligned}$$

2.2 Utility Function

All individuals in the domestic country have the same preferences, and maximize the utility function given by:

$$U^i(n, Y^c) = n^i + u(Y^{ci}) \quad (3)$$

where $i = x, y$, and m which represent the shareholders of the export competing firm, the import competing firm, and the owners of the migrant factor, respectively; n^i is the consumption of numeraire good; $Y^{ci} = y^{ci} + y^{*ci}$ is the total consumption of the homogeneous goods y and y^* by individual i . The function $U(\cdot)$ is differentiable, increasing, and strictly concave in all arguments. Utility is maximized subject to the budget constraint:

$$I^i \geq n^i + p^y Y^{ci} \quad (4)$$

where I^i is the net income of individual i ; p^y is the domestic (relative) price of good y , in terms of the price of the numeraire good which is normalized to one. The consumption of good y does not depend on income.

$$Y^{ci} = Y^c(p^y) \text{ for all } i, Y^{c'}(p^y) < 0$$

From Eq.(3) and Eq.(4), the indirect utility function of each individual in group i has the form as:

$$V^i = I^i + u(Y^c) - p^y Y^c = I^i + CS(p^y)$$

where $i = x, y$, and m ; CS = consumer surplus derived from good Y

The gross indirect utility functions for each individual in each group are given by:

$$\begin{aligned} V^x &= \frac{\pi^x}{\alpha^x} + \frac{ty^* - sx}{\alpha^x + \alpha^y} + CS \\ V^y &= \frac{\pi^y}{\alpha^y} + \frac{ty^* - sx}{\alpha^x + \alpha^y} + CS \\ V^m &= \frac{\pi^m}{\alpha^m} + CS \end{aligned}$$

where π^x and π^y are described in Eq.(1) and Eq.(2); π^m is the total constant return of the migrant factor; $(ty^* - sx)$ is the net revenue from the export subsidy and import tariff.

Taking the export subsidy and import tariff set by the government as given, the indirect utility function identifies the utility level of an individual in group i could be attained, if lobbying is not allowed.

3 Equilibrium Policies in the Absence of Lobbying

The equilibrium policies based on the social planner's objective function are solved in this section. Given the equilibrium policies, the gainers and the losers from the higher levels of trade intervention can be identified. Identification of the gainers and the losers determines the positions that individuals will take regarding the implementation of the trade policies.

3.1 Equilibrium Policies without Lobbying

In the absence of lobbying, the domestic government sets the levels of trade intervention by maximizing the aggregate social welfare. The government's objective function is given by:

$$Max_{s,t} W = \alpha^x V^x + \alpha^y V^y + \alpha^m V^m \quad (5)$$

where W is the social welfare level which can be attained in the absence of any political contributions to the government.

After solving the first-order conditions, the optimal levels of trade intervention for the domestic economy are as:

$$s^w = \frac{\pi_s^x - x}{x_s} = \frac{xp'x_s^*}{x_s} > 0 \quad (6)$$

$$t^w = \frac{-(\pi_t^y + y^* + CS_t)}{y_t^*} \leq 0 \quad (7)$$

where the superscript w denotes the intervention levels which maximize the domestic welfare and $CS_t = -p^y Y_t^c Y^c < 0$.

The optimal trade policies derived above are identical to Brander-Spencer optimal strategic trade policies. The optimal export subsidy is positive in equilibrium, whereas the optimal import tariff can be positive, zero or negative depending on the relative convexity of demand.¹¹ We ignore the detailed discussion here since it is not the focus of this paper.

¹¹Brander and Spencer (1984a) state that the equilibrium tariff is negative, zero, or positive as the measure of relative convexity is less than, equals, or exceeds minus one.

3.2 Welfare Effects

Evaluating the effects of more trade intervention on each individual in each interest group at the optimal intervention levels, we have:

$$V_s^x |_{s=s^w} = \frac{\alpha^y}{\alpha^x(\alpha^x + \alpha^y)} \pi_s^x > 0 \quad (8)$$

$$V_s^y |_{s=s^w} = -\frac{\pi_s^x}{\alpha^x + \alpha^y} < 0 \quad (9)$$

$$V_t^x |_{t=t^w} = -\frac{\pi_t^y}{\alpha^x + \alpha^y} + \frac{\alpha^x + \alpha^y - 1}{\alpha^x + \alpha^y} CS_t \leq 0 \quad (10)$$

$$V_t^y |_{t=t^w} = \frac{\alpha^x}{\alpha^y(\alpha^x + \alpha^y)} \pi_t^y + \frac{\alpha^x + \alpha^y - 1}{\alpha^x + \alpha^y} CS_t > 0 \quad (11)$$

Eq.(8) to Eq.(11) imply that at the optimal levels of export subsidy and import tariff, an increase in the export subsidy increases the shareholders of domestic export competing firm's welfare, but decreases the shareholders of import competing firm's welfare; an increase in the import tariff increases the shareholders of domestic import competing firm's welfare, but may increase or decrease the shareholders of export competing firm's welfare depending on the size of the extra tariff revenue and the loss of consumer surplus. Eq.(8) to Eq.(11) also help us identify the gainers and the losers from higher levels of export subsidy and import tariff. The shareholders of export competing firm are the gainers and the shareholders of import competing firm are the losers from more export promotion, and the shareholders of import competing firm are the gainers from more import protection. This identification reveals the incentives for the shareholders of manufacture firms to organize as interest groups and to participate in lobbying.

4 Equilibrium Policies in the Presence of Lobbying

This section analyzes the case that both the shareholders of export competing and import competing firms organize as interest groups and try to influence the policy outcomes by lobbying. The owners of the migrant factor are assumed not organized, therefore, they are not represented by any interest group.

4.1 The Structure of Lobbying

The lobbying structure follows Grossman-Helpman (1994) framework which applies Bernheim and Whinston's (1986) study on menu-auction. The two interest groups, as the bidders, offer various contribution schedules corresponding to different set of policies to the incumbent government at the first stage. The government, as the auctioneer, sets the policy by evaluating the weighted sum of contributions and aggregated social welfare at the second stage. An equilibrium is a set of contribution schedules, and a set of trade policies.

The equilibrium contribution schedules imply that the interest groups make contributions up to the point where the marginal benefit from the resulting change in the intervention level exactly equals the marginal contribution costs.¹² In equilibrium, the contribution schedules of each interest group are given by:

$$\begin{aligned}\alpha^i V_s^i &= \lambda_s^i(s) \\ \alpha^i V_t^i &= \gamma_t^i(t)\end{aligned}\tag{12}$$

where $i = x, y$; $\lambda^i(s)$ and $\gamma^i(t)$ are the contribution schedules provided by interest group i , and they are differentiable at s and t , respectively.

¹²Following the proposition 1 of Grossman-Helpman (1994) and the lemma 2 of Bernheim and Whinston (1986), we only consider the case that the contribution schedules are differentiable, and around the equilibrium point. The equilibrium set being sub-game perfect Nash equilibrium implies that all the contribution schedules are locally truthful around the equilibrium policies where the marginal change of the contributions matches the marginal change of the interest groups' gross welfare.

4.2 Equilibrium Policies with Lobbying

The government's objective is to maximize the possibility of being reelected. With lobbying, other than providing high standard of living to the general public, the government has another resource to enhance its possibility of being reelected, i.e., the contributions provided by the interest groups. With lobbying, the government's objective function not only contains the aggregate social welfare but also the total level of political contributions. The objective function can be written as:

$$Max_{s,t} V^G = (\beta - 1)[\lambda^x(s) + \lambda^y(s) + \gamma^x(t) + \gamma^y(t)] + W \quad (13)$$

where $\beta > 1$ represents the weight that the government puts on the contributions provided by the interest groups.¹³

The first-order conditions of government's optimization problem are:

$$V_s^G = (\beta - 1)(\lambda_s^x + \lambda_s^y) + W_s = 0$$

$$V_t^G = (\beta - 1)(\gamma_t^x + \gamma_t^y) + W_t = 0$$

Substituting Eq.(12) into above, we have:

$$V_s^G = \beta(\alpha^x V_s^x + \alpha^y V_s^y) + \alpha^m V_s^m = 0 \quad (14)$$

$$V_t^G = \beta(\alpha^x V_t^x + \alpha^y V_t^y) + \alpha^m V_t^m = 0 \quad (15)$$

Eq.(14) and Eq.(15) imply that the more the government values the campaign contributions provided by the interest groups, the greater the weight of interest groups' welfare is in the government's objective function.

¹³ $\beta > 1$ implies that the government values a dollar offered by the interest groups more than a dollar in the hands of the public.

From the first-order conditions, the equilibrium intervention levels in the presence of lobbying can be solved as:

$$s^p = \frac{\pi_s^x - x}{x_s} = \frac{xp'x_s^*}{x_s} > 0 \quad (16)$$

$$t^p = -\frac{[(\alpha^x + \alpha^y) + \frac{\alpha^m}{\beta}]CS_t + \pi_t^y + y^*}{y_t^*} \quad (17)$$

where the superscript p denotes the levels of intervention determined by the political process.

Comparing Eq.(16) and Eq.(17) with Eq.(6) and Eq.(7), we have:

$$s^w = s^p$$

$$t^w < t^p$$

The equilibrium export subsidy in the presence of lobbying is the same as that set by the benevolent dictator, therefore, there is no distortion on the export subsidy caused by lobbying. This surprising result is due to the fact that export subsidy does not cause any loss of consumer surplus in the domestic country.

Under Brander-Spencer framework, the government's objective function is the national welfare, which is just the pure economic profits. With Grossman-Helpman politically-determined subsidy, the objective function of the policymaker is a weighted sum of campaign contributions and national welfare. By applying the property of truthful contribution schedules, the equilibrium condition turns out just depending on the pure economic profits. Therefore, the levels of export subsidy are the same in both cases. On the other hand, the politically-determined import tariff is higher than the optimal one since the loss of consumer surplus is undervalued.

Proposition 1 : *With lobbying, the politically-determined export subsidy is exactly the same as the optimal subsidy; the politically-determined import tariff is*

higher than the optimal level.¹⁴

One may question that since the politically-determined export subsidy is exactly the same as the one set by the benevolent dictator, the two interest groups will not participate in the political process of determining the subsidy level. However, without sustainable cooperation between the two groups, lobbying on both policies is the optimal strategy for both groups even they may lose the contributions. Consider the case that the export competing firm is the only one providing contributions to the government and lobby for a higher level of export subsidy, the equilibrium export subsidy will be higher than the optimal one, and the import competing firm will obviously be harmed by the higher export subsidy. Following the same logic, the export competing firm will be hurt if the import competing firm lobbies and the export competing firm does not. Hence, even both interest groups can anticipate that lobbying leads the same outcome, they still choose to lobby.¹⁵

5 General Results

5.1 Production Structure

The perspective of Brander-Spencer "third-market" model is adopted to avoid the complications of welfare effects and no domestic consumption of the exportable goods is assumed in the previous sections. This assumption is relaxed in this section.

After incorporating domestic consumption, the firms have to make the decisions on how much to produce for their own country and how much to produce

¹⁴In other words, the lobbying on subsidy does not cause any welfare loss if contributions are treated as the net transfer within the domestic country.

¹⁵ $s^x = \frac{(\frac{\alpha^x + \alpha^y}{\beta\alpha^x + \alpha^y})\pi_s^x - x}{x_s} > s^w$ and $s^y = \frac{(\frac{\alpha^x + \alpha^y}{\alpha^x + \beta\alpha^y})\pi_s^y - x}{x_s} < s^w$ where superscript x and y represent that the export subsidy is joint determined by the government and one lobby x , and y , respectively. According to Eq.(8) and Eq.(9), the interest group will be harmed by the lobbying of another group if he chooses not to lobby.

for export.

The objective functions of the firms producing the export competing goods are given by:

$$\begin{aligned}\pi^x &= p^x(x + x^{*e})x + p^{x*}(x^* + x^e)x^e - c^x(x) - c^{x^e}(x^e) + sx^e \\ \pi^{x*} &= p^{x*}(x^* + x^e)x^* + p^x(x + x^{*e})x^{*e} - c^{x*}(x^*) - c^{x^{*e}}(x^{*e})\end{aligned}$$

where π^x is the profit of the domestic export competing firm; x and x^e are the goods that domestic firm produces for the domestic market and foreign market, respectively; asterisk refers to foreign country variable; $p^x(x + x^{*e})$ is the inverse demand of homogeneous goods x and x^{*e} in the domestic market; $p^{x*}(x^* + x^e)$ is the inverse demand of homogeneous goods x^e and x^* in the foreign market;¹⁶ s is the per unit export subsidy provided by the domestic government.

After some algebra, the effects of the export subsidy on each market can be shown as:

$$\begin{aligned}\frac{d(x + x^{*e})}{ds} &= 0 \\ \frac{d(x^* + x^e)}{ds} &= \frac{\pi_{xx^{*e}}^x \pi_{x^e x^*}^{x*} \pi_{x^* x^e}^{x*} - \pi_{xx}^x \pi_{x^* x^*}^{x*} \pi_{x^{*e} x^{*e}}^{x*}}{D} > 0 \\ \frac{dp^x}{ds} &= p^{x'} \frac{d(x + x^{*e})}{ds} = 0 \\ \frac{dp^{x*}}{ds} &= p^{x^{*'}} \frac{d(x^* + x^e)}{ds} < 0\end{aligned}$$

where $D = \det \begin{pmatrix} \pi_{xx}^x & \pi_{xx^e}^x & \pi_{xx^*}^x & \pi_{xx^{*e}}^x \\ \pi_{x^e x}^x & \pi_{x^e x^e}^x & \pi_{x^e x^*}^x & \pi_{x^e x^{*e}}^x \\ \pi_{x^* x}^{x*} & \pi_{x^* x^e}^{x*} & \pi_{x^* x^*}^{x*} & \pi_{x^* x^{*e}}^{x*} \\ \pi_{x^{*e} x}^{x*} & \pi_{x^{*e} x^e}^{x*} & \pi_{x^{*e} x^*}^{x*} & \pi_{x^{*e} x^{*e}}^{x*} \end{pmatrix} > 0$

The objective functions of the firms producing the import competing goods are given by:

$$\begin{aligned}Max_{y,y^e} \pi^y &= p^y y + p^{y^*} y^e - c^y(y) + c^{y^e}(y^e) \\ Max_{y^*, y^{*e}} \pi^{y^*} &= p^{y^*} y^* + p^y y^{*e} - c^{y^*}(y^*) - c^{y^{*e}}(y^{*e}) - ty^{*e}\end{aligned}$$

¹⁶The domestic market and foreign market are assumed segmented.

Similarly, the effects of tariff on each market can be shown as:

$$\begin{aligned}\frac{d(y + y^{*e})}{dt} &= \frac{\pi_{yy}^y \pi_{y^e y^e}^y \pi_{y^* y^*}^{y^*} - \pi_{y^e y^*}^y \pi_{yy^{*e}}^y \pi_{y^* y^e}^{y^*}}{D^y} < 0 \\ \frac{d(y^* + y^e)}{dt} &= 0 \\ \frac{dp^y}{dt} &= p^{y'} \frac{d(y + y^{*e})}{dt} > 0 \\ \frac{dp^{y^*}}{dt} &= 0\end{aligned}$$

where $D^y = \det \begin{pmatrix} \pi_{yy}^y & \pi_{yy^e}^y & \pi_{yy^*}^y & \pi_{yy^{*e}}^y \\ \pi_{y^e y}^y & \pi_{y^e y^e}^y & \pi_{y^e y^*}^y & \pi_{y^e y^{*e}}^y \\ \pi_{y^* y}^{y^*} & \pi_{y^* y^e}^{y^*} & \pi_{y^* y^*}^{y^*} & \pi_{y^* y^{*e}}^{y^*} \\ \pi_{y^{*e} y}^{y^*} & \pi_{y^{*e} y^e}^{y^*} & \pi_{y^{*e} y^*}^{y^*} & \pi_{y^{*e} y^{*e}}^{y^*} \end{pmatrix} > 0$

5.2 Utility Function

All individuals in the domestic country have the same preferences, and maximize the utility function subject to the budget constraint:

$$\begin{aligned}Max U^i(n, X^c, Y^c) &= n^i + u(X^{ci}, Y^{ci}) \\ \text{subject to } I^i &\geq n^i + p^x X^{ci} + p^y Y^{ci}\end{aligned}$$

where X^{ci} is total consumption of good x and x^{*e} by individual i , and all the definitions of other variables are the same as in section 2.2.

The gross indirect utility functions for each individual in each group are given by:

$$\begin{aligned}V^x &= \frac{\pi^x}{\alpha^x} + \frac{ty^{*e} - sx^e}{\alpha^x + \alpha^y} + CS \\ V^y &= \frac{\pi^y}{\alpha^y} + \frac{ty^{*e} - sx^e}{\alpha^x + \alpha^y} + CS \\ V^m &= \frac{\pi^m}{\alpha^m} + CS\end{aligned}$$

5.3 Equilibrium Policies without Lobbying

Without lobbying, the government's objective is to maximize the aggregate social welfare as Eq.(5). After some algebra, the equilibrium policies without lobbying are given by:

$$s^w = \frac{\pi_s^x - x^e + CS_s}{x_s^e} > 0$$

$$t^w = -\frac{\pi_t^y + y^{*e} + CS_t}{y_t^{*e}} \geq 0$$

where $CS_s = 0$ and $CS_t = -p_t^y Y^c < 0$

5.4 Equilibrium Policies with Lobbying

With lobbying, the government's objective function contains the contributions provided by the interest groups and the aggregate social welfare as Eq.(13).

Following the same procedures, the politically-determined policies are:

$$s^p = \frac{\pi_s^x - x^e + (\alpha^x + \alpha^y + \frac{\alpha^m}{\beta})CS_s}{x_s^e}$$

$$t^p = -\frac{[(\alpha^x + \alpha^y) + \frac{\alpha^m}{\beta}]CS_t + \pi_t^y + y^{*e}}{y_t^{*e}}$$

Comparing the politically-determined policies with the optimal policies leads the following proposition:

Proposition 2 *With lobbying, the politically-determined export subsidy is exactly the same as that is set by the benevolent dictator; the politically-determined tariff is higher than the optimal level even incorporating domestic consumption in the model.*

6 The Case of Two Unequally Effective Interest Groups

The case that the two interest groups are not equally effective in influencing government policies is discussed in this section. Let β^x and β^y represent the weight that the government evaluates export competing firm's contributions and import competing firm's contributions, respectively. The government's objective function is:

$$Max_{s,t} V^G = (\beta^x - 1)[\lambda^x(s) + \gamma^x(t)] + (\beta^y - 1)[\lambda^y(s) + \gamma^y(t)] + W \quad (18)$$

After some algebra, the distortion of lobbying on both policies can be shown as:

$$\Delta s = s^{p'} - s^w = \left[\frac{\alpha^y \left(1 - \frac{\beta^y}{\beta^x}\right)}{\alpha^x + \alpha^y \left(\frac{\beta^y}{\beta^x}\right)} \right] \left(\frac{\pi_s^x}{x_s} \right) \quad (19)$$

$$\begin{aligned} \Delta t = t^{p'} - t^w = & \left[1 - \frac{\left(\frac{\beta^x}{\beta^y} \alpha^x + \alpha^y + \alpha^m\right) (\alpha^x + \alpha^y)}{\left(\frac{\beta^x}{\beta^y} \alpha^x + \alpha^y\right)} \right] \left(\frac{CS_t}{y_t^*} \right) \\ & + \left(1 - \frac{\alpha^x + \alpha^y}{\left(\frac{\beta^x}{\beta^y}\right) \alpha^x + \alpha^y} \right) \left(\frac{\pi_t^y}{y_t^*} \right) \end{aligned} \quad (20)$$

where $s^{p'}$ and $t^{p'}$ define the equilibrium export subsidy and import tariff when the two interest groups are not equally effective and are solved from the first-order conditions of Eq.(18).

The sign of Δs is positive if $\beta^x > \beta^y$, and vice versa. The sign of Δt is positive if $\beta^y > \beta^x$, however, the sign of Δt is ambiguous if $\beta^x > \beta^y$.

Proposition 3 *If the two interest groups are not equally effective in lobbying, the politically-determined export subsidy is higher than the optimal level if export*

competing firm is more effective, and vice versa; the politically-determined import tariff is higher than the optimal level if the import competing firm is more effective, however, the politically-determined import tariff can be either higher or lower if the export competing firm is more effective.

7 Equilibrium Contributions

7.1 Truthful Contribution Schedules

The equilibrium contributions are characterized in this section. In fact, the set of contribution schedules supporting the equilibrium policies is not unique. Following Grossman-Helpman (1994), only the truthful contribution schedules are considered.¹⁷ Truthful contribution schedules are differentiable and take the forms as:

$$\lambda^i(s, z^{is}) = \text{Max}[0, \alpha^i V^i(s, t^w) - z^{is}] \quad (21)$$

$$\gamma^i(t, z^{it}) = \text{Max}[0, \alpha^i V^i(s^w, t) - z^{it}] \quad (22)$$

where $i = x, y$; z^{is} and z^{it} are scalars and represent the reservation value. The truthful Nash equilibria arise when the interest groups announce their truthful contribution schedules. From the definition of a truthful contribution schedule, the net welfare to interest group i will be the reservation value z . Hence, the interest groups will choose the reservation value as large as possible. The interest groups have incentive to raise the z as long as the contributions associated with a set of feasible policies remain positive. However, interest group i must be careful not to raise z too large that the government decides to adopt the disadvantageous policies.

¹⁷Grossman and Helpman follow Bernheim and Whinston's (1986) study on a menu-auction problem and define the truthful contribution schedule as "....a contribution schedule that everywhere reflects the true preferences of the lobby."

7.2 Indifferent Conditions for the Government

The truthful contribution schedule suggests that the government must be indifferent between opting the equilibrium policy and receiving the equilibrium contributions from both interest groups, or taking positive contributions from only one interest group, and implementing the policy which is optimal for that interest group. Following the assumption that the contribution schedules for the two policies are separate, lobbying on these two different policy instruments is indeed independent. This relationship can be written as:

$$W(s^p, t^w) + (\beta - 1)[\lambda^x(s^p; z^{xs}) + \lambda^y(s^p; z^{ys})] = W(s^i, t^w) + (\beta - 1)[\lambda^i(s^i; z^{is})] \quad (23)$$

$$W(s^w, t^p) + (\beta - 1)[\gamma^x(t^p; z^{xt}) + \gamma^y(t^p; z^{yt})] = W(s^w, t^i) + (\beta - 1)[\gamma^i(s^i; z^{it})] \quad (24)$$

where (s^p, t^p) is the equilibrium policy characterized in Eq.(16) and Eq.(17); (s^i, t^i) is the policy determined by the joint welfare of the government and interest group i only.

Eq.(23) describes the indifferent conditions for the government on the determination of export subsidy, taking the import tariff as given (at the optimal level); Eq.(24) describes the indifferent conditions for the government on the determination of import tariff, taking the export subsidy as given (at optimal level).

After some algebra, the reservation value z and the equilibrium contributions can be written as:

$$\begin{aligned} (\beta - 1)z^{is} &= W(s^p, t^w) + (\beta - 1)[\alpha^x V^x(s^p, t^w) + \alpha^y V^y(s^p, t^w)] \\ -W(s^j, t^w) - (\beta - 1)[\alpha^j V^j(s^j, t^w)] &> 0 \end{aligned} \quad (25)$$

$$\begin{aligned} (\beta - 1)z^{it} &= W(s^w, t^p) + (\beta - 1)[\alpha^x V^x(s^w, t^p) + \alpha^y V^y(s^w, t^p)] \\ -W(s^w, t^j) - (\beta - 1)[\alpha^j V^j(s^w, t^j)] &> 0 \end{aligned} \quad (26)$$

where $i = x, y; i \neq j$. The first two terms in the right-hand side of Eq.(25) [respectively, Eq.(26)] measure the maximum gross welfare attained by the government and two active interest groups, taking tariff (respectively, subsidy) as given. The last two terms in the right-hand side of Eq.(25) [respectively, Eq.(26)] measure the maximum gross welfare attained by the government and one interest group, taking tariff (respectively, subsidy) as given.

Eq.(25) and Eq.(26) are strictly positive, which imply that both interest groups are able to extract some rent from the political process. The larger is the reservation value, the larger is the net welfare to interest group i .

Subtracting $(\beta - 1)\alpha^i V^i(s^p, t^w)$ and $(\beta - 1)\alpha^i V^i(s^w, t^p)$ from both side of Eq.(25) and Eq.(26), respectively and rearranging them, we show that the contributions are strictly positive:

$$\begin{aligned} (\beta - 1)[\alpha^i V^i(s^p, t^w) - z^{is}] &= W(s^j, t^w) + (\beta - 1)\alpha^j V^j(s^j, t^w) \\ -W(s^p, t^w) - (\beta - 1)[\alpha^j V^j(s^p, t^w)] &> 0 \end{aligned} \quad (27)$$

$$\begin{aligned} (\beta - 1)[\alpha^i V^i(s^w, t^p) - z^{it}] &= W(s^w, t^j) + (\beta - 1)\alpha^j V^j(s^w, t^j) \\ -W(s^w, t^p) - (\beta - 1)[\alpha^j V^j(s^w, t^p)] &> 0 \end{aligned} \quad (28)$$

where $i = x, y; i \neq j$. Eq.(25) to Eq.(28) lead the following proposition:

Proposition 4 *In equilibrium, $z^{is} > 0$ and $z^{it} > 0, i = x, y$; which imply that both interest groups can capture some rent from lobbying; $\lambda^i(s^i; z^{is}) > 0$ and $\gamma^i(t^i; z^{it}) > 0$, which state that contributions provided by both interest groups are strictly positive.*

8 Can Lobbying Improve the Domestic Social Welfare?

Can lobbying improve the domestic social welfare? The answer is obviously no if the incumbent government is a benevolent dictator as described in section 3.

However, if the government is not a benevolent dictator and the contributions are the only concern of the government, the welfare may be improved by the lobbying.

The case that the government only cares about the campaign contributions is considered in this section. We assume that without the campaign contributions, there will be free trade in the domestic market, i.e., $s = 0$ and $t = 0$. Assume both interest groups provide the contributions to influence government's policy decision, the government's objective function becomes:

$$Max_{s,t} V^G = \lambda^x(s) + \gamma^x(t) + \lambda^y(s) + \gamma^y(t)$$

After some algebra, the equilibrium policies are solved as:

$$s^{p''} = \frac{(\pi_s^x - x)}{x_s} = s^w$$

$$t^{p''} = -\frac{(\alpha^x + \alpha^y)CS_t + \pi_t^y + y^*}{y_t^*} > t^p > t^w$$

where the superscript p'' denotes the levels of intervention determined solely by the contributions provided by the two active interest groups. The welfare change due to the lobbying on export subsidy can be written as:

$$\Delta W^s = W(s = s^{p''}, t = 0) - W(s = 0, t = 0) = \pi^x(x, x^*; s = s^{p''}) - \pi^x(x, x^*; s = 0) > 0 \quad (29)$$

Eq.(29) represents the extra profit earned by the domestic export competing firm. With lobbying, the export subsidy is restored to the most efficient level since $s^{p''} = s^w$ and the domestic welfare is higher than that in free trade.¹⁸

¹⁸If we take the wasted resource into account, there is one more term $-\delta[\lambda^x(s) + \lambda^y(s)]$ in the right-hand-side of Eq.(29). $\delta[\lambda^x(s) + \lambda^y(s)]$ represents the resource wasted in the political process, and $0 \leq \delta \leq 1$. As $\delta = 0$, the government effectively redistributes total contributions to the domestic residents, hence the contributions are just transfers within the domestic country. As $\delta = 1$, the total amount of contributions represents a deadweight loss to domestic welfare by the political process.

The welfare change due to the lobbying on import tariff can be written as:

$$\begin{aligned}
\Delta W^t &= W(s = 0, t = t^{p''}) - W(s = 0, t = 0) \\
&= [\pi^y(y, y^*; t = t^{p''}) - \pi^y(y, y^*; t = 0)] + t^{p''}y^* \\
&+ [CS(y, y^*; t = t^{p''}) - CS(y, y^*; t = 0)] \stackrel{\leq}{\geq} 0
\end{aligned} \tag{30}$$

The first term in the right-hand-side of Eq.(30) represents the sum of the extra profit earned by the domestic import competing firm. The second term measures the tariff revenue collected from the foreign rivalry. The third term measures the consumer surplus loss. The direction of the welfare change depends on the magnitude of these three terms, and it is ambiguous.¹⁹

Proposition 5 *If the contributions are the only concern of the domestic government and are treated as the net transfer within the domestic country, lobbying on export subsidy resets the subsidy to the optimal level, and improves domestic welfare; lobbying on import tariff sets the tariff higher than the optimal level, and domestic welfare is improved when the extra rent transferred from the foreign rivalry is larger than the consumer surplus loss.*

9 Cooperative Lobbying

9.1 The Structure of Cooperative Lobbying

The conditions for sustainable cooperation are assumed to be satisfied. Based on this assumption, we discuss the case that the two interest groups join together as a cartel in this section.

The contribution schedules offered by the cartel in equilibrium are given by:

¹⁹Similarly, if we take the wasted resource into account, there is one more term $-\delta[\gamma^x(t) + \gamma^y(t)]$ in the right-hand-side of Eq.(30).

$$\alpha^x V_s^x + \alpha^y V_s^y = \lambda_s$$

$$\alpha^x V_t^x + \alpha^y V_t^y = \gamma_s$$

where $\lambda(s)$ and $\gamma(t)$ are the joint contributions to the government.

The government's objective function is defined as:

$$Max_{s,t} V^{G'} = (\beta - 1)(\lambda + \gamma) + W$$

After solving the first-order conditions, the politically-determined export subsidy and import tariff are identical to those described in section 4.

9.2 Joint Contributions

Since the politically-determined policies in the non-cooperative and cooperative setting are exactly the same, the next task is to compare the amount of contributions in both cases. Given the same policies, if the total contributions provided by the cartel are smaller, then the cooperation of the two active interest groups is welfare improving.²⁰

As previous sections, only the truthful contribution schedules are considered, which have the form as:

$$\lambda(s, z^s) = Max[0, \alpha^x V^x + \alpha^y V^y - z^s] \quad (31)$$

$$\gamma(t, z^t) = Max[0, \alpha^x V^x + \alpha^y V^y - z^t] \quad (32)$$

where z^s, z^t are the reservation value of the cartel.

²⁰If the contributions are treated as the net transfer within the domestic country, non-cooperative and cooperative lobbying lead the same policies and welfare.

The indifferent conditions are given by:

$$W(s^p, t^w) + (\beta - 1)\lambda(s^p; z^s) = W(s^w, t^w) \quad (33)$$

$$W(s^w, t^p) + (\beta - 1)\gamma(t^p; z^p) = W(s^w, t^w) \quad (34)$$

Since $s^p = s^w$, Eq.(33) implies the joint contributions for the export subsidy provided by the cartel is reduced to zero. Hence, the cooperation is welfare improving in the subsidy case. However, the joint contributions for the import tariff are positive. In order to know whether the cooperation is welfare improving in the tariff case, we need to exam the sign of $\gamma - \gamma^x - \gamma^y$. Since the contributions are smaller with the larger reservation value, if we can prove that $z^t > z^{xt} + z^{yt}$, then the cooperation is welfare improving in the tariff case.

If $z^t > z^{xt} + z^{yt}$, the equilibrium contributions are smaller with the cartel than in a decentralized setting in the tariff case. It implies that cooperation reduces the amount of resources wasted in the political process. Using Eq.(31) to Eq.(34), we can express $z^t > z^{xt} - z^{yt}$ as Eq.(35). $z^t > z^{xt} - z^{yt}$ if and only if Eq.(35) > 0 .

$$\begin{aligned} & \Sigma_{i=x,y}[W(s^w, t^i) + (\beta - 1)\alpha^i V^i(s^w, t^i)] \\ & > W(s^w, t^w) + W(s^w, t^p) + (\beta - 1)[\alpha^x V^x(s^w, t^p) + \alpha^y V^y(s^w, t^p)] \end{aligned} \quad (35)$$

The left-hand-side of Eq.(35) measures the maximum welfare that can be attained by the government and one active interest group, taking subsidy as given; the right-hand-side of Eq.(35) measures the maximum welfare can be attained by the government alone and by the government and both interest groups. Eq.(35) is more likely to be satisfied if the interests of both groups diverge from each other. Without further information, the sign of Eq.(35) can not be determined.

Proposition 6 *If lobbying incurs real resource cost, then joint lobbying on export subsidy improves domestic welfare. However, the direction of welfare change can go up or down with respect to the joint lobbying on the import tariff.*

10 Concluding Remarks

This paper incorporates imperfect competition in Grossman-Helpman (1994) political framework to study the lobbying effects over the strategic trade policies.

The levels of trade intervention without lobbying are the same as the optimal strategic trade policies by Brander-Spencer (1984, 1985). When both interest groups lobby the policymaker, the government sets policies by maximizing the weighted sum of contributions and aggregate social welfare. Our central results are that the equilibrium politically-determined Dixit-Grossman-Helpman export subsidy is exactly the same as Brander-Spencer optimal strategic subsidy, whereas the equilibrium politically-determined import tariff is higher than the optimal strategic level since the loss of consumer surplus is undervalued. The results hold even after incorporating domestic consumption of the exportable goods in the model.

This paper also highlights that lobbying on export subsidy improves domestic welfare by restoring the export subsidy to the most efficient level in the absence of the benevolent dictator. However, lobbying on the import tariff can increase or decrease domestic welfare in the absence of a benevolent dictator.

If both active interest groups cooperate, the politically-determined equilibrium policies will stay the same. However, the joint contributions for lobbying on the export subsidy will be reduced to zero, which implies that cooperation of lobbying groups improves domestic welfare if real resources are used up in lobbying. This is due to the elimination of the resource wasted in lobbying. The direction of welfare change regarding to joint lobbying on the import tariff can be higher or lower.

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