Lobbying for Administered Protection

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December 1, 2002

Abstract

This paper suggests an explanation why administered protection is often chosen as a tool of regulating trade, considering administered protection as an institutional form alternative to legislated protection. We discuss that the government's choice of trade policy is restricted under the regime of administered protection, and such a restriction on the choice of the government can eliminate the conflicting interests of special interest groups, making the interest groups better off under the regime of administered protection. Also, switching the regime from legislated protection to administered protection can improve the total welfare of economy.

1 Introduction

For the last several decades, administered protection policies, such as antidumping duty, countervailing duty, and escape clause, has become one of the most heavily used tools of trade protection in the U.S. In response to such an increase in the importance of administered protection, trade economists have come to pay more attention to administered protection policies, especially to antidumping duty policy. There are many theoretical and empirical researches examining the effects of antidumping duty policy on trade volume, on firms' strategic behavior, and on economic welfare.[1] However, these papers remain silent to a more fundamental question: why is administered protection chosen as a tool of protection? A main objective of this paper is to suggest an answer to this question.

As far as we know, there are two papers that give explanation why administered protection is chosen as a tool of protection. One is Bagwell and Staiger (1990) and the other is Hall and Nelson (1992). Our paper is closely related to Hall and Nelson's paper, where they consider that administered protection and legislated protection are alternative institutional forms to provide trade protection. According to Hall-Nelson, legislated protection is an institutional form where protection is provided through legislation of various trade laws which specifically aims to protect individual industries. Accordingly, special interest groups can lobby for protection of individual industries. On the other hand, administered protection is another institutional form where protection is provided by implementing the rules written in administered protection laws. Thus, under the regime of administered protection, lobbying activities to increase the level of protection must be directed to changing the rules, and the changes in the rules will in general affect the levels of protection of all import-competing industries, since the rules are by creation applicable to all industries. Making this distinction between legislated protection and administered protection, Hall-Nelson argues that protection is strictly a private good (from the perspective of an industry as a whole)[2] under the regime of legislated protection, while it is a public good under the regime of administered protection. Thus, there is a free-rider problem in lobbying under the regime of administered protection. From this argument, they derive a result that the level of lobbying activities and the equilibrium level

[1] Examples of theoretical researches are Gruenspecht (1988), Kolev and Prusa (1999), and Staiger and Wolak (1992). Examples of empirical researches are Blonegen (1999), Gallaway, Blonigen, and Flynn (1999), and Staiger and Wolak (1994).

[2] Of course, protection is a public good among firms within an industry. Thus, the underlying assumption of the argument by Hall-Nelson is that the firms in the industry have overcome the free-rider problem.

of protection is lower under the regime of administered protection than under the regime of legislated protection, due to the free-rider problem. Therefore, it can be concluded that, assuming the small open economy, the welfare of the economy under the regime of administered protection is higher than the welfare under the regime of legislated protection.[3]

The insight of Hall-Nelson to contrast administered protection with legislated protection is noteworthy, and their intuition of the free-rider problem in administered protection is appealing. However, several features of their analytical framework may need reconsideration. First, they assume that a tariff is determined as a function of lobbying efforts, and their result of the free-rider problem in administered protection seems dependent on this assumption. Second, they do not model the objective function of the government. From their result, an economist as an outside observer can claim that administered protection is better than legislated protection, but it is not clear that whether the government prefers administered protection to legislated protection. Third, they do not pay very much attention to the well-being of import-competing sectors. Thus, whether the import-competing sectors prefer administered protection to legislated protection is not clear, either.

In this paper, we follow Hall-Nelson's insight to contrast administered protection with legislated protection, considering administered protection as an alternative institutional form of protection. However, we suggest a different explanation why administered protection is chosen, by using a model developed by Grossman and Helpman (1994), considering the formation of trade policies as a common agency problem. In this paper, we emphasize that the government's choice of trade policy is restricted under the regime of administered protection, since what the government chooses are not the sector-specific tariffs but the rules of administered protection. We discuss that, in the perspective of the special interest groups, the advantage of administered protection over legislated protection lies in such a restriction on the latitude of the government to choose trade policy, and demonstrate that in some situation interest groups prefer the regime of administered protection to the regime of legislated protection.

We also compare the total welfare of the economy under two protection regimes. We find that switching

[3] A Similar idea is originated from Rodrik (1986), in explaining why tariffs are chosen over production subsidies for redistributing income to import-competing industries. Noticing that a tariff necessarily benefits all of firms in an industry while subsidies can be firm specific, he showed that the economic welfare under tariff regime can be higher than the welfare under subsidy regime.

the regime from legislated protection to administered protection can be welfare improving. Thus, the administered protection may be supported by the general public as well as the special interest groups. We consider that our result is a possible explanation why protection is often provided via administered protection.

Our argument that the administered protection may be supported by the trade lobbies is motivated by the analysis of Grossman-Helpman (1994) and Dixit, Grossman, and Helpman (1997), where they argue that the inefficient policy instruments may be supported by the special interest groups. One of the differences of our argument from theirs is that, in this paper, we suggest that not only an inefficient policy instrument, but also a policy instrument that directly restricts the choice of the government is also available, and that such a policy can eliminate, not just mitigate, the conflict of the interests among the special interests. In addition, although in their analysis the intense conflict among the lobbies is necessary for the lobbies to support inefficient policies, in our model the intense conflict among the lobbies is just sufficient for the lobbies to support the administered protection regime.

The rest of the paper is organized as follows. First, in Section 2, we present our analytical framework. Then, in section 3, we explain how we model the regime of legislated protection and the regime of administered protection, and examine the equilibrium level of protection under two regimes of protection. The main result of the paper, the comparison of the equilibrium payoffs under two regimes of protection, is presented in Section 4. The total welfare of the economy is discussed in Section 5. Finally, short concluding comments are given in section 6.

2 The model

The analytical framework we use here is a simplified version of the Grossman-Helpman (1994) model. Consider a small open economy with three goods, labeled good 0, 1, and 2. Good 0 serves as a numeraire, with world and domestic prices equal to one. By appropriate choices of unit, the world prices of a nonnumeraire goods are all normalized to one. The wedge between the domestic price and the world price is created by the trade taxes and subsidies. Letting t_i denote the ad valorem trade tax on good i, the domestic price of good i is denoted by $1 + t_i$.

The population of the economy is also normalized to one. All individuals have identical preferences, but they differ in their endowments. Each individual owns labor, and at most one type of sector-specific capital.

In the economy, all goods are produced in competitive markets. Good 0 (the numeraire good) is produced from labor alone, under constant-return-to-scale technology with input-output coefficient equal to 1. In a competitive equilibrium, the wage rate is thus equal to 1. A nonnumeraire good i, where $i = 1, 2$, is produced from labor and a sector-specific capital K_i under constant-return-to-scale technology, $y_i = f_i(K_i, L_i)$, where y_i is the quantity produced and L_i is the labor employed in the production of good i. The sector-specific capitals are perfectly inelastically supplied. With the wage rate equal to 1 and the CRS technology, the rent to a sector-specific capital[4] is given by $\pi_i(t_i) = (1 + t_i)f_i(K_i, L_i(t_i)) - L_i(t_i)$. By the envelope theorem, the domestic supply of good i is given by $y_i(t_i) = \pi_i'(t_i)$.

Now, we look at the demand side of the economy. A representative consumer's utility maximization problem is given by

$$\max U = x_0 + u_1(x_1) + u_2(x_2) \quad \text{s.t.} \quad x_0 + (1 + t_1)x_1 + (1 + t_2)x_2 = E$$

where x_i is consumption of good i, and E is income of the representative consumer. The subutility functions $u_i(\cdot)$ are differentiable, increasing, and strictly concave. With the quasi-linear preferences, the demand for nonnumeraire good i is given by $x_i = d_i(t_i)$, where $d_i(\cdot)$ is the inverse of $u_i'(\cdot)$, and the demand for the numeraire good is given by $x_0 = E - \sum_{i=1}^{2}(1 + t_i)d_i(t_i)$. The indirect utility function of the representative consumer is thus $V(\mathbf{t}, E) = E + s_1(t_1) + s_2(t_2)$, where $\mathbf{t} = (t_1, t_2)$ is the vector of trade taxes, and $s_i(t_i) = u_i(d_i(t_i)) - (1 + t_i)d_i(t_i)$ is consumer surplus from good i.

As we alluded above, in this model, the policy instruments available to the government are restricted to trade taxes and subsidies. Furthermore, since our interest is protection from foreign competition, we assume that sector 1 and sector 2 are import-competing sectors. Thus, we can interpret that $t_i > 0$ as a tariff and $t_i < 0$ as an import subsidy. The revenue from the tariff (or the expenditure for the subsidy) in sector i is given by $r_i(t_i) = t_i m_i(t_i)$, where $m_i(t_i) = d_i(t_i) - y_i(t_i)$ is the import demand for good i.

[4] We assume that an ower of a sector-specific capital is also an ower of a firm.

We assume that the revenue is uniformly distributed to all individuals in the economy.

The income of an individual is described as follows. We use α_i, where $i = 1, 2$, to denote the fraction of the population who own sector-i specific capital. Letting E_i denote the total income of the owners of sector-i specific capital, we can write $E_i = l_i + \pi_i(t_i) + \alpha_i [r_1(t_1) + r_2(t_2)]$, where l_i is the total labor supply (and thus the total labor income) of the owners of sector-i specific capital. The welfare of the owners of sector-i specific capital, measured by indirect utility, is then given by

$$V_i(\mathbf{t}) = l_i + \pi_i(t_i) + \alpha_i [r_1(t_1) + r_2(t_2) + s_1(t_1) + s_2(t_2)]. \tag{1}$$

For the individuals who own labor only, the fraction of those individuals in the total population is given by $1 - \alpha_1 - \alpha_2$. Thus, the welfare of the individuals who own labor only is written as

$$V_0(\mathbf{t}) = l_0 + (1 - \alpha_1 - \alpha_2) [r_1(t_1) + r_2(t_2) + s_1(t_1) + s_2(t_2)]. \tag{2}$$

The total welfare of the economy is the sum of V_i's:

$$\begin{aligned} W(\mathbf{t}) &= V_0(\mathbf{t}) + V_1(\mathbf{t}) + V_2(\mathbf{t}) \\ &= l + \pi_1(t_1) + \pi_2(t_2) + r_1(t_1) + r_2(t_2) + s_1(t_1) + s_2(t_2) \end{aligned}$$

where $l = l_0 + l_1 + l_2$.

The welfare of the individuals who own labor only is influenced by trade policy only through the consumer surplus and the transfer from the government (see equation (2)). On the other hand, the welfare of the specific-capital owners is influenced by trade policy not only through the consumer surplus and the transfer from the government, but also through the rent to the capital (see equation (1)). In other words, the specific-capital owners are concerned with the formation of trade policy not only as a consumer or as a recipient of the government transfer, but also as a producer. In this sense, the specific-capital owners have more interest in trade policy than those individuals who own labor only. From this reason, in this paper, we assume that the owners of specific capital in each sector are politically organized to form a lobby group to pursue their common interest in trade policy, while the individuals who own labor only remain politically unorganized. That is, in the economy there are two lobby groups: lobby group i to represent the interest of the owners of sector-i specific capital, where $i = 1, 2$. Throughout the paper, we use the term a lobby, a lobby group, or a special interest group interchangeably.

Lobbying activities in this model take the form of making political contributions to the incumbent government. Specifically, each lobby group offers political contribution to the incumbent government, contingent on trade policies implemented by the government. We use $C_i(\mathbf{t}) \geq 0$ to denote the political contribution offered by lobby group i.

In this model, the political contributions by the lobby groups can influence the government's choice of trade policy because it is assumed that the government is concerned not only about the total welfare of the economy but also about the total political contributions it collects. Specifically, the government's objective function is modeled as a weighted sum of the contributions it collects and the total welfare of the economy: $G = C_1(\mathbf{t}) + C_2(\mathbf{t}) + aW(\mathbf{t})$, where $a > 0$ is a weight on the total welfare of the economy.

Now, we describe the lobbying game. The players of the game are the lobby group 1 and 2, and the government. First, each lobby group simultaneously chooses the contribution schedule, $C_i(\mathbf{t})$. Then, given the contribution schedules, the government chooses the policy vector $\mathbf{t}$, and collects the contributions from the lobby groups. The payoff to lobby i is $n_i = V_i(\mathbf{t}) - C_i(\mathbf{t})$, and the payoff to the government is $C_1(\mathbf{t}) + C_2(\mathbf{t}) + aW(\mathbf{t})$. An equilibrium outcome is a set of contribution schedules offered by the lobby groups, and the vector of trade policy chosen by the government. In general, a contribution schedule $C_i(\mathbf{t})$ can take any shape. However, in this model, we impose a restriction that contribution schedules be truthful. For the details about and the rationale for the truthful contribution schedule, see Bernheim-Whinston, Grossman-Helpman, and Dixit, Grossman, and Helpman (1997).

3 Equilibrium tariffs

3.1 Legislated protection

As we mentioned in the introduction, we consider that legislated protection is an institutional form of trade protection where the sector-specific tariffs are *chosen* by the legislative body of the government, i.e., Congress, through legislation of various trade laws. In other words, under the regime of legislated protection, the government has discretion to choose different tariffs in different sectors. Therefore, under this regime, special interest groups can lobby for different tariffs in different sectors through Congress. In the context of the analytical framework presented in the preceding section, the policy choice of the government is a vector $\mathbf{t}$ in $\mathbb{R}^2$ under the regime of legislated protection.[5] Accordingly, the contribution schedule offered by each lobby group is contingent on vector $\mathbf{t}$. This is exactly how the formation of protection policy is analyzed by Grossman-Helpman. That is, in our terminology, the Grossman-Helpman has examined the formation of protection policy under the regime of legislated protection.

Under the regime of legislated protection, given the contribution schedules, the government chooses $\mathbf{t}$ to maximize the weighted sum of the contributions and the total welfare of the economy. Letting $\mathbf{t}^L$ denote the vector of the equilibrium tariff under the legislated protection regime, we can write

$$\mathbf{t}^L = \underset{\mathbf{t}}{\operatorname{argmax}} \left[C_1(\mathbf{t}) + C_2(\mathbf{t}) + aW(\mathbf{t}) \right].$$

From our assumption that contribution schedules are truthful, it can be shown that $\mathbf{t}^L$ is derived as if the government were to maximize the joint welfare of the lobby groups and the government. That is,

$$\mathbf{t}^L = \underset{\mathbf{t}}{\operatorname{argmax}} \left[V_1(\mathbf{t}) + V_2(\mathbf{t}) + aW(\mathbf{t}) \right]. \tag{3}$$

This is because a truthful contribution schedule reflects the exact shape of the welfare of a lobby.[6] The

[5] In reality, import subsidies (i.e., $t_i < 0$) are rarely observed. To make the model reflect this reality, we may restrict the policy choice to nonnegative trade taxes. Such a restriction does not change our results presented in Section 3.4. Alternatively, we may interpret that a zero tariff as a "status quo" level of the tariff, and a positive tariff as an increase and an import subsidy as a decrease in the tariff. In this interpretation, we need to modify the payoff to the government in such a way that it prefers the "status quo" policy the most when there is no political contributions.

[6] See Bernheim-Whinston (1986) and Grossman-Helpman (1994) for the detail.

first-order condition for the maximization in (3), with respect to t_i, gives

$$(1-\alpha_M)\, y_i(t_i) + (a+\alpha_M)\, t_i m_i'(t_i) = 0,$$

where $\alpha_M = \alpha_1 + \alpha_2$. Throughout this paper, we assume that $V_1(\mathbf{t})+V_2(\mathbf{t}) + aW(\mathbf{t})$ is concave in $\mathbf{t}$, so that the second-order conditions are always satisfied. We also assume that $V_i(\mathbf{t}) + aW(\mathbf{t})$, $i = 1, 2$, and $W(\mathbf{t})$ are also concave in $\mathbf{t}$. By arranging the first-order condition, the equilibrium tariff under the legislated protection is given by

$$t_i^L = \frac{1-\alpha_M}{a+\alpha_M} \frac{y_i(t_i^L)}{\left(-m_i'(t_i^L)\right)}, \text{ for } i = 1, 2. \tag{4}$$

3.2 Administered protection

We consider that administered protection is an institutional form alternative to legislated protection. Under the regime of administered protection, the tariffs in various sectors are *determined* by the executive agencies of the government. For example, antidumping duty (ADD) and countervailing duty (CVD) policies are implemented by the Department of Commerce (DOC) and the International Trade Commission (ITC). These agencies determine whether the protection is granted or not, and how much protection is granted, according to the rules established by the laws. Thus, under this regime, the determination of tariffs is in principle not influenced by the political activities of the special interest groups.

In reality, however, the determination of tariffs under administered protection policies is often not fully independent of political influences. There are, at least, three observations that administered protection sometimes has political aspects. First, as Prusa (1992) and Anderson (1992, 1993) pointed out, some of ADD and CVD cases have been ended with voluntary export restraints or other nontariff barriers, rather than duties. Baldwin (1985) provided an interesting story that the steel industry in the U.S., which had initiated the request of protection by filing petitions for ADD and CVD, has after all obtained the trigger price mechanism by influencing Congress and the President. These observations indicate that even in ADD and CVD policies, the political activities of special interest groups may have influence on the determination of the protection levels. Second, the DOC's calculation of antidumping duties, and the

ITC's determination of the cases, have been often criticized as being discretionary. This suggests that the executive agencies may be influenced by special interest groups. Third, as Baldwin and Moore (1991) discussed, the laws or the rules of administered protection have often been changed. This suggests that special interest groups can seek an increase in the protection levels by lobbying for the changes in the laws or the rules of administered protection through Congress.

In this paper, we abstract from the first and second point stated above: that is, we assume that the tariffs under the administered protection regime are always determined by the rules, that the rules of administered protection are clearly known to everyone thus there is no discretion in implementation, and that the agencies implementing the laws are not influenced by lobby groups. From this assumption, we can emphasize the distinct characteristics of administered protection: the main route through which the special interest groups to seek an increase in the protection level is to lobby for the changes of the laws or the rules of administered protection. Since those rules are by creation generally applicable, the changes in the rules will affect the protection levels of *all* import-competing sectors.

In the context of our analytical framework, we model this characteristic of administered protection as follows. We suppose that the rules of administered protection are summarized by a scalar τ, and a tariff of sector i is determined by the rule $t_i = \tau\delta_i$. Here, $\delta_i \geq 0$ is a sector-specific parameter which measures how the sector is applicable to the administered protection policy. If we consider the administered protection policy here as unfair trade policy such as antidumping duty or countervailing duty, δ_i is a "piece of evidence" for unfair exporting behavior of foreign exporters. For example, in antidumping duty policy, δ_i is interpreted as the size of dumping margin in sector i: i.e., how large the foreign exporters "dump" their products.[7] Or, in countervailing duty policy, δ_i is interpreted as the size of export subsidies given by the foreign government to the foreign exporters. In this model, we treat δ_i as an exogenous parameter, assuming that the evidence is hard enough that neither the interest groups nor the government can forge or falsify it. Also, we assume that δ_i's are in common knowledge. With δ_i exogenously given, and the administered protection rule given by $t_i = \tau\delta_i$, the policy choice of the government is a scalar τ.[8] In

[7] Our assumption of the small open economy is not inconsistent with dumping by foreign exporters. For example, we may consider that the foreign exporter is a monopolist in its country, and it engages in international price discrimination. The foreign exporter is a dominant firm who set the price, and the domestic sector consists of price-taking fringe firms.

[8] In order to maintain the consistency with the regime of legislated protection where t_i can be positive or negative, we do not impose a restriction that τ be nonnegative. As we mentioned earlier, our results will not change even if we assume

other words, the tariffs chosen by the government must lie on the ray from the origin in $\mathbb{R}^2$ space.[9] A domain of the political contribution schedules is accordingly restricted to the ray.

With this setting, under the administered protection regime the government chooses τ to maximize the weighted sum of the contributions and the total welfare of the economy. Let τ^A denote the equilibrium rule of administered protection. As in the case of legislated protection, since a truthful contribution schedule reflects the exact shape of the welfare of a lobby, τ^A is derived as if the government were to maximize the joint welfare of the lobby groups and the government:

$$\tau^A = \underset{\tau}{\operatorname{argmax}} \left[V_1(\mathbf{t}) + V_2(\mathbf{t}) + aW(\mathbf{t}) \right]. \tag{5}$$

where $\mathbf{t} = (\tau\delta_1, \tau\delta_2)$. The first-order condition for the maximization problem (5) is

$$(1 - \alpha_M) \left[y_1(t_1)\delta_1 + y_2(t_2)\delta_2 \right] + (a + \alpha_M) \left[t_1 m_1'(t_1)\delta_1 + t_2 m_2'(t_2)\delta_2 \right] = 0. \tag{6}$$

Rearranging the equation above, the equilibrium rule of administered protection is expressed as

$$\tau^A = \frac{1 - \alpha_M}{a + \alpha_M} \frac{y_1(t_1^A)\delta_1 + y_2(t_2^A)\delta_2}{\left[- \left(m_1'(t_1^A)\delta_1^2 + m_2'(t_2^A)\delta_2^2 \right) \right]},$$

where $t_i^A = \tau^A \delta_i$ is the equilibrium tariff under the administered protection regime.

3.3 Comparison of the protection regimes

We can now compare the equilibrium tariffs under two regimes. Proposition 1 below shows that if one sector receives a higher tariff under the administered protection regime, then the other sector must receive a lower tariff under the administered protection regime.

Proposition 1 *If $t_i^A > t_i^L$, then $t_j^A < t_j^L$ where $j \neq i$.*

$t_i \geq 0$ and $\tau \geq 0$. Alternatively, we may consider $\tau = 0$ as "status quo" policy, with $\tau > 0$ as an increase and $\tau < 0$ as a decrease from the status quo policy.

[9] Combining $t_1 = \tau\delta_1$ and $t_2 = \tau\delta_2$, we can write the restriction on the choice of the government as $t_2 = (\delta_2/\delta_1)t_1$.

Proof. Suppose that $t_1^A > t_1^L$ and $t_2^A \geq t_2^L$. Then, by the concavity of $V_1 + V_2 + aW$, we have

$$(1 - \alpha_M)\, y_1(t_1^A) + (a + \alpha_M) t_1^A m_1'(t_1^A) < 0 \text{ and } (1 - \alpha_M)\, y_2(t_2^A) + (a + \alpha_M) t_2^A m_2'(t_2^A) \leq 0.$$

These two inequalities imply that

$$(1 - \alpha_M) \left[y_1(t_1^A)\delta_1 + y_2(t_2^A)\delta_2 \right] + (a + \alpha_M) \left[t_1^A m_1'(t_1^A)\delta_1 + t_2^A m_2'(t_2^A)\delta_2 \right] < 0.$$

This contradicts the definition of t_i^A's (see equation (6)). ■

In contrasting legislated protection and administered protection, Hall and Nelson (1992) argue that the tariffs under the administered protection regime is less than the tariffs under legislated protection regime, since lobbying for administered protection has the property of a public good. However, as Proposition 1 has shown, all sectors cannot have smaller tariffs under the administered protection regime than under the legislated protection regime. Thus, the argument of Hall-Nelson that the administered protection regime gives uniformly lower tariffs than the legislated protection regime is not valid in our lobbying game.

4 Equilibrium payoffs

Now we are going to find the equilibrium payoffs under two protection regimes. As we noted earlier, the lobbying game we study here is an application of the menu-auction game analyzed by Bernheim-Whinston. Thus, we can use their result of characterizing the equilibrium payoffs of the menu-auction game (see Theorem 2 of Bernheim-Whinston. Also, see Laussel and Le Breton (2001)). In short, the main idea of Bernheim-Whinston is as follows. When choosing its contribution schedule, a lobby has to consider what the government would choose if it were to make no contribution at all to the government. In order to let the government to choose the equilibrium policy, each lobby has to make a contribution at least as large as the difference between what the government receives in equilibrium and what the government would receive if the lobby were to make no contribution at all. Below, we will explain this in detail, as characterizing the equilibrium payoffs of our lobbying game.

4.1 Legislated protection

Let $C_i^L(\cdot)$ and $n_i^L = V_i(\mathbf{t}^L) - C_i^L(\mathbf{t}^L)$ respectively denote the equilibrium contribution schedule and the equilibrium payoff of lobby i under the legislated protection regime. The equilibrium payoffs of the lobbies (n_1^L, n_2^L) are characterized as follows.

Consider the set of payoffs defined by the following three inequalities

$$n_1 \le \left[V_1(\mathbf{t}^L) + V_2(\mathbf{t}^L) + aW(\mathbf{t}^L)\right] - \left[V_2(\mathbf{t}^{L,2}) + aW(\mathbf{t}^{L,2})\right] \quad (\mathrm{L}_1)$$

$$n_2 \le \left[V_1(\mathbf{t}^L) + V_2(\mathbf{t}^L) + aW(\mathbf{t}^L)\right] - \left[V_1(\mathbf{t}^{L,1}) + aW(\mathbf{t}^{L,1})\right] \quad (\mathrm{L}_2)$$

$$n_1 + n_2 \le \left[V_1(\mathbf{t}^L) + V_2(\mathbf{t}^L) + aW(\mathbf{t}^L)\right] - aW(\mathbf{0}) \quad (\mathrm{L})$$

where $\mathbf{t}^{L,i} = (t_1^{L,i}, t_2^{L,i})$ is $\arg\max_{\mathbf{t}} [V_i(\mathbf{t}) + aW(\mathbf{t})]$. That is, $\mathbf{t}^{L,i}$ is the policy that would be chosen if the government were to care about the interest of lobby i only. A pair (n_1^L, n_2^L) is a pair of the equilibrium payoffs if and only if: (i) it belongs to the set defined by (L_1), (L_2), and (L); and (ii) there is no other (n_1, n_2) which belongs to the set defined by (L_1), (L_2), and (L), such that $(n_1^L, n_2^L) \le (n_1, n_2)$. The interpretation of these conditions is seen by rewriting (L_1), (L_2), and (L) in terms of the equilibrium contributions:

$$C_1^L(\mathbf{t}^L) \ge \left[V_2(\mathbf{t}^{L,2}) + aW(\mathbf{t}^{L,2})\right] - \left[V_2(\mathbf{t}^L) + aW(\mathbf{t}^L)\right] \quad (\hat{\mathrm{L}}_1)$$

$$C_2^L(\mathbf{t}^L) \ge \left[V_1(\mathbf{t}^{L,1}) + aW(\mathbf{t}^{L,1})\right] - \left[V_1(\mathbf{t}^L) + aW(\mathbf{t}^L)\right] \quad (\hat{\mathrm{L}}_2)$$

$$C_1^L(\mathbf{t}^L) + C_2^L(\mathbf{t}^L) \ge aW(\mathbf{0}) - aW(\mathbf{t}^L) \quad (\hat{\mathrm{L}})$$

On the right hand side of $(\hat{\mathrm{L}}_1)$, the first term $V_2(\mathbf{t}^{L,2}) + aW(\mathbf{t}^{L,2})$ is the maximum joint welfare that lobby 2 and the government would achieve if the interest of lobby 1 were entirely disregarded. That is, if lobby 1 remained politically inactive and made no contribution, the government would choose $\mathbf{t}^{L,2}$, and the lobby 2 and the government would receive the joint welfare of $V_2(\mathbf{t}^{L,2}) + aW(\mathbf{t}^{L,2})$. The second term $V_2(\mathbf{t}^L) + aW(\mathbf{t}^L)$ is, on the other hand, the joint welfare that lobby 2 and the government actually receive in equilibrium. Thus, we can interpret that the right hand side of ($\hat{\text{L}}_1$) measures how much lobby 2 and the government together are made worse off by the political participation of lobby 1. That is, the right hand side of ($\hat{\text{L}}_1$) can be seen as the amount of the "harm" that lobby 1 inflicts on lobby 2 and the government. Inequality ($\hat{\text{L}}_1$) states that the equilibrium contribution of lobby 1 has to be at least as large as this amount of the harm, since otherwise the equilibrium policy $\mathbf{t}^L$ would not be chosen. Similarly, ($\hat{\text{L}}_2$) states that in equilibrium lobby 2 has to make a contribution that compensates for the harm it inflicts on lobby 1 and the government. For inequality ($\hat{\text{L}}$), the first term on the right hand side, $aW(\mathbf{0})$, is the highest payoff the government would receive if neither lobbies were making any contributions,[10] while the second term $aW(\mathbf{t}^L)$ is what the government actually receives (excluding the contributions) in equilibrium. Thus, we can interpret that the right hand side of ($\hat{\text{L}}$) measures how much the government is made worse off by the deadweight loss, which is due to the political participation of lobby 1 and lobby 2. Inequality ($\hat{\text{L}}$) states that the sum of the equilibrium contributions made by lobby 1 and lobby 2 must be large enough to compensate the government for the deadweight loss created by the equilibrium trade policy. Putting it differently, we may consider $aW(\mathbf{0})$ as the "reservation payoff" to the government: at worst, when there were no contributions, the government could secure the payoff $aW(\mathbf{0})$ by choosing free trade ($\mathbf{t} = \mathbf{0}$). In equilibrium, the lobbies collectively have to contribute at least the amount which leaves the government just indifferent between choosing no tariff ($\mathbf{t} = \mathbf{0}$) and the equilibrium tariff ($\mathbf{t} = \mathbf{t}^L$). These are the interpretation of condition (i).

For condition (ii), notice that if there existed (n_1, n_2) such that $(n_1, n_2) \geq (n_1^L, n_2^L)$, then at least one lobby could increase its net payoff by lowering its contribution, without changing the government's choice of the equilibrium trade policy. Thus, for (n_1^L, n_2^L) to be an equilibrium, there must be no such (n_1, n_2). In other words, condition (ii) says that the equilibrium payoffs (n_1^L, n_2^L) must be on the Pareto efficient frontier of the set defined by (L_1), (L_2), and (L). Therefore, for all $i = 1, 2$, (L_i) or (L) must be satisfied in equality.

In Lemma 1 below, we show that if (L_1) and (L_2) are satisfied, then (L) is also satisfied (i.e., (L) is slack). Thus, the equilibrium payoffs under the regime of legislated protection are always given by (L_1)

[10] $W(\mathbf{t})$ is maximized at $\mathbf{t} = \mathbf{0}$ since $\partial W(\mathbf{t})/\partial t_i = t_i m_i'(t_i) = 0$ only when $t_i = 0$.

and (L_2) in equality (see Figure 1). Letting $\mathcal{L}_1$, $\mathcal{L}_2$, and $\mathcal{L}$ denote the right hand sides of (L_1), (L_2), and (L) respectively, we can thus write $n_1^L = \mathcal{L}_1$ and $n_2^L = \mathcal{L}_2$.

Lemma 1 $\mathcal{L} \geq \mathcal{L}_1 + \mathcal{L}_2$. *The equality holds if and only if* $\alpha_M = 0$.

Proof. See Appendix A. ■

A main implication of Lemma 1 is that, except $\alpha_M = 0$, the sum of equilibrium contributions is more than enough to compensate the government for the deadweight loss created by the equilibrium trade policy: that is, $C_1^L(\mathbf{t}^L) + C_2^L(\mathbf{t}^L) > aW(\mathbf{0}) - aW(\mathbf{t}^L)$. In other words, the government receives some rent. This is because, as long as $\alpha_M > 0$, there is a conflict of the interests between lobby 1 and lobby 2. Lobby 1 wants to have an import tariff on its good as a producer, and it wants to have import subsidy on good 2 as a consumer; while lobby 2 wants exactly the opposite. Thus, the lobbies vie in getting the government's favor, each lobby bidding for policies that is favorable to it and bidding against policies that is favorable to the other lobby. As a result of such political competition between the lobbies, the government earns some rent.

4.2 Administered protection

Now let us consider the administered protection regime. We use $C_i^A(\cdot)$ and $n_i^A = V_i(\mathbf{t}^A) - C_i^A(\mathbf{t}^A)$ respectively to denote the equilibrium contribution schedule and the equilibrium payoff of lobby i under the administered protection regime. Similar to our analysis in section 4.1, the equilibrium payoffs under the administered protection regime are characterized by the following set:

$$n_1 \leq \left[V_1(\mathbf{t}^A) + V_2(\mathbf{t}^A) + aW(\mathbf{t}^A)\right] - \left[V_2(\mathbf{t}^{A,2}) + aW(\mathbf{t}^{A,2})\right] \qquad (A_1)$$

$$n_2 \leq \left[V_1(\mathbf{t}^A) + V_2(\mathbf{t}^A) + aW(\mathbf{t}^A)\right] - \left[V_1(\mathbf{t}^{A,1}) + aW(\mathbf{t}^{A,1})\right] \qquad (A_2)$$

$$n_1 + n_2 \leq \left[V_1(\mathbf{t}^A) + V_2(\mathbf{t}^A) + aW(\mathbf{t}^A)\right] - aW(\mathbf{0}) \qquad (A)$$

where $\mathbf{t}^{A,i} = (t_1^{A,i}, t_2^{A,i})$ is $\text{argmax}_{\mathbf{t}}\,[V_i(\mathbf{t}) + aW(\mathbf{t})]$, subject to $\mathbf{t} = (\tau\delta_1, \tau\delta_2)$. That is, $\mathbf{t}^{A,i}$ is the protection policy that the government would choose if it were to care about only the interest of lobby i. A pair (n_1^A, n_2^A) is a pair of equilibrium payoffs if and only if: (i) it belongs to the set defined by (A_1),

(A_2), and (A); and (ii) there is no (n_1, n_2) which belongs to the set defined by (A_1), (A_2), and (A), such that $(n_1^A, n_2^A) \leq (n_1, n_2)$. The interpretation of these conditions is similar to the one we saw in Section 4.1.

Under the regime of legislated protection, we found that (L) is slack thus the equilibrium payoffs are always given by (L_1) and (L_2) in equality. However, under the regime of administered protection, in some cases (A) is binding, and in other cases it is slack. We demonstrate this in the following two examples. To facilitate the exposition of the examples, we present here what $\mathbf{t}^A$, $\mathbf{t}^{A,1}$ and $\mathbf{t}^{A,2}$ look like.

$$t_1^A = \tau^A \delta_1,\ t_2^A = \tau^A \delta_2;\text{ where } \tau^A = \frac{1-\alpha_M}{a+\alpha_M}\frac{y_1(t_1^A)\delta_1 + y_2(t_2^A)\delta_2}{\left[-m_1'(t_1^A)\delta_1^2 - m_2'(t_2^A)\delta_2^2\right]}$$

$$t_1^{A,1} = \tau^{A,1}\delta_1,\ t_2^{A,1} = \tau^{A,1}\delta_2;\text{ where } \tau^{A,1} = \frac{(1-\alpha_1)y_1(t_1^{A,1})\delta_1 - \alpha_1 y_2(t_2^{A,1})\delta_2}{(a+\alpha_1)\left[-m_1'(t_1^{A,1})\delta_1^2 - m_2'(t_2^{A,1})\delta_2^2\right]}$$

$$t_1^{A,2} = \tau^{A,2}\delta_1,\ t_2^{A,2} = \tau^{A,2}\delta_2;\text{ where } \tau^{A,2} = \frac{-\alpha_2 y_1(t_1^{A,2})\delta_1 + (1-\alpha_2)y_2(t_2^{A,2})\delta_2}{(a+\alpha_2)\left[-m_1'(t_1^{A,2})\delta_1^2 - m_2'(t_2^{A,2})\delta_2^2\right]}$$

Example 1 *Let $\alpha_1 = \alpha_2 = 0$, $\delta_1 = \delta_2 > 0$, and $y_1(\cdot) > y_2(\cdot)$. In this case, it is straightforward to show that $0 < \tau^{A,2} < \tau^{A,1} < \tau^A$. Notice that $\partial V_2/\partial\tau = y_2(t_2)\delta_2 > 0$ when $\alpha_2 = 0$. Thus, V_2 is increasing in τ. Therefore, $V_2(\mathbf{t}^{A,2}) < V_2(\mathbf{t}^{A,1})$. Letting $\mathcal{A}_1$, $\mathcal{A}_2$, and $\mathcal{A}$ denote the right hand sides of equations (A_1), (A_2), and (A) respectively, we have*

$$\begin{aligned} & \mathcal{A}_1 + \mathcal{A}_2 - \mathcal{A} \\ = \ & \left[V_1(\mathbf{t}^A) + V_2(\mathbf{t}^A) + aW(\mathbf{t}^A)\right] - \left[V_1(\mathbf{t}^{A,1}) + V_2(\mathbf{t}^{A,1}) + aW(\mathbf{t}^{A,1})\right] \\ & + \left[aW(\mathbf{0}) - aW(\mathbf{t}^{A,2})\right] + \left[V_2(\mathbf{t}^{A,1}) - V_2(\mathbf{t}^{A,2})\right] > 0, \end{aligned}$$

because the second line is nonnegative by the definition of $\mathbf{t}^A$, the first term in the third line is nonnegative since W is maximized at $\mathbf{t} = \mathbf{0}$, and the second term in the third line is positive since $V_2(\mathbf{t}^{A,2}) < V_2(\mathbf{t}^{A,1})$. Therefore, $\mathcal{A}_1 + \mathcal{A}_2 > \mathcal{A}$. Hence, (A) is binding in this case.

Example 2 *Let $\alpha_1 > 0$, $\alpha_2 > 0$, $\delta_1 > 0$, $\delta_2 = 0$, and $y_1(\cdot) > y_2(\cdot)$. In this case, $\tau^{A,2} < 0 < \tau^A < \tau^{A,1}$. When $\delta_2 = 0$, $\partial V_2/\partial\tau = \alpha_2\left[t_1 m_1'(t_1)\delta_1 - y_1(t_1)\delta_1\right] < 0$ as long as $t_1 \geq 0$. Thus, V_2 is decreasing in τ for*

$\tau \geq 0$. Therefore, $V_2(0) > V_2(t^A)$. Then,

$$
\begin{aligned}
& \mathcal{A} - (\mathcal{A}_1 + \mathcal{A}_2) \\
= \; & \left[V_1(\mathbf{t}^{A,1}) + aW(\mathbf{t}^{A,1})\right] - \left[V_1(\mathbf{t}^{A}) + aW(\mathbf{t}^{A})\right] \\
& + \left[V_2(\mathbf{t}^{A,2}) + aW(\mathbf{t}^{A,2})\right] - \left[V_2(\mathbf{0}) + aW(\mathbf{0})\right] \\
& + \left[V_2(\mathbf{0}) - V_2(\mathbf{t}^{A})\right] > 0,
\end{aligned}
$$

because the second and the third lines are nonnegative by the definition of $\mathbf{t}^{A,1}$ and $\mathbf{t}^{A,2}$, and the fourth line is positive since $V_2(0) > V_2(\mathbf{t}^A)$. Therefore, $\mathcal{A}_1 + \mathcal{A}_2 < \mathcal{A}$. Hence, (A) is slack in this case.

When (A) is binding, the equilibrium payoffs are not unique (see Figure 2). A more important feature of the equilibrium when (A) is binding is that the government is left with no rent, because $n_1^A + n_2^A = \mathcal{A}$ implies that $C_1^A(\mathbf{t}^A) + C_2^A(\mathbf{t}^A) + aW(\mathbf{t}^A) = aW(\mathbf{0})$. On the other hand, when (A) is slack, the equilibrium payoffs are unique: they are given by (A_1) and (A_2) in equality (see Figure 2). The government receives some rent in this case.

The intuition as to why (A) is binding in some cases and slack in the other cases is explained as follows. Recall that, under the administered protection regime, what the government chooses and what interest groups lobby for is not the sector-specific tariffs, but the rule parameter of administered protection τ, which is applied to both sectors. Thus, an increase in the tariff of sector j, which comes from an increase in τ, is always accompanied by an increase in the tariff of sector i, benefitting lobby group i as a producer, and hurting lobby group i as a consumer. If α_i's are small enough that the interests of both lobbies are mainly of producers, then their interests are neither conflicting nor orthogonal. Rather, their interests are congruent: i.e., both lobbies simply prefer higher τ. This is the case demonstrated in Example 1, where each lobby is not harmed but benefitted from the political participation of other lobby. Because of such congruence of the interests, each lobby does not have to bid against the policies pursued by other lobby. Therefore, what the lobbies collectively need to pay to the government is the amount just enough to compensate the government for the deadweight loss. That is, (A) is binding. In general, when α_i's are small or when δ_2/δ_1 is close to one, both V_1 and V_2 are increasing in τ, so (A) is binding.

On the other hand, if δ_i is very small relative to δ_j, then an increase in τ results in a very small increase in t_i, relative to an increase in t_j. In this case, the interest of lobby i is mainly of consumers, while the interest of lobby j is mainly of producers. Thus, the interests of the lobbies conflict each other, lobby j bidding for and lobby j bidding against higher τ. In this case, the contribution each lobby makes in equilibrium is equal to the harm it inflicts on other lobby and the government, and the sum of the equilibrium contribution is more than enough to compensate the government for the deadweight loss. That is, (A_1) and (A_2) is binding, and (A) is slack. This is the case demonstrated in Example 2. In general, when δ_2/δ_1 is very small or very large, or when α_i's are large enough, one of V_i is likely decreasing in τ for $\tau \geq 0$, thus (A) is slack.

4.3 Comparison of the protection regimes

Now, we are ready to compare the equilibrium payoffs under different protection regimes. First, in Lemma 2 we present the necessary and sufficient conditions that both lobbies can receive higher equilibrium payoffs under the administered protection regime than under the legislated protection regime.

Lemma 2 *The lobbying game under the regime of administered protection has a set of equilibria such that $n_1^A \geq n_1^L$ and $n_2^A \geq n_2^L$ if and only if $\mathcal{L}_1 \leq \mathcal{A}_1$, $\mathcal{L}_2 \leq \mathcal{A}_2$ and $\mathcal{L}_1 + \mathcal{L}_2 \leq \mathcal{A}$.*

Proof. See Appendix B. ■

Using Lemma 2, we now consider an interesting special case where the administered protection is preferred by the lobbies.

Proposition 2 *If $\delta_2/\delta_1 = t_2^L/t_1^L$, the lobbying game under the regime of administered protection has a set of equilibria such that $n_1^A \geq n_1^L$ and $n_2^A \geq n_2^L$. The strict inequalities hold as long as $\alpha_M > 0$.*

Proof. From Lemma 2, what we need to show is $\mathcal{L}_1 \leq \mathcal{A}_1$, $\mathcal{L}_2 \leq \mathcal{A}_2$ and $\mathcal{L}_1 + \mathcal{L}_2 \leq \mathcal{A}$, where the strict inequalities hold as long as $\alpha_M > 0$.

First, we claim that $\delta_2/\delta_1 = t_2^L/t_1^L$ implies $\mathbf{t}^A = \mathbf{t}^L$. Since $t_2^A/t_1^A = \delta_2/\delta_1$, if $\mathbf{t}^A \neq \mathbf{t}^L$, then it would be either $t_1^A > t_1^L$ and $t_2^A > t_2^L$, or $t_1^A < t_1^L$ and $t_2^A < t_2^L$. However, this contradicts Proposition 1. Therefore,

$\mathbf{t}^A = \mathbf{t}^L$, as claimed. Now, using $\mathbf{t}^A = \mathbf{t}^L$,

$$\mathcal{A}_1 - \mathcal{L}_1 = \left[V_2(\mathbf{t}^{L,2}) + aW(\mathbf{t}^{L,2})\right] - \left[V_2(\mathbf{t}^{A,2}) + aW(\mathbf{t}^{A,2})\right] \geq 0$$

since $V_2(\mathbf{t}^{L,2}) + aW(\mathbf{t}^{L,2})$ is an unconstrained maximum while $V_2(\mathbf{t}^{A,2}) + aW(\mathbf{t}^{A,2})$ is a constrained maximum. In addition, because $V_2(\mathbf{t}) + aW(\mathbf{t})$ is concave and $\mathbf{t}^{L,2} \neq \mathbf{t}^{A,2}$, $\mathcal{A}_1$ is strictly greater than $\mathcal{L}_1$. By the similar reasoning, $\mathcal{A}_2 - \mathcal{L}_2 > 0$.

When $\mathbf{t}^A = \mathbf{t}^L$, $\mathcal{A} = \mathcal{L}$. Thus, $\mathcal{A} - (\mathcal{L}_1 + \mathcal{L}_2) = \mathcal{L} - (\mathcal{L}_1 + \mathcal{L}_2) \geq 0$, where the strict inequality holds when $\alpha_M > 0$. ■

See Figure 3 for an illustration of the proposition. The intuition of Proposition 2 is not hard to see. When the administered protection regime replicates the equilibrium policy of the legislated protection regime ($\mathbf{t}^A = \mathbf{t}^L$), the gross payoff V_i are the same under both regimes. Thus, the net payoff under the administered protection regime is larger than the net payoff under the legislated protection regime if the equilibrium contribution under the administered protection is smaller. As we explained earlier, under the legislated protection regime t_1 and t_2 are independently determined. Consequently, the interests of the lobbies conflict in the dimensions of t_1 *and* t_2 under the legislated protection regime. On the other hand, under the administered protection regime, t_1 and t_2 cannot be independently determined: a higher t_1 is always accompanied with a higher t_2. In some situations the interests of the lobbies are congruent. In other situations the interest of the lobbies are in conflict, but even in the case of conflicting interest, the dimension of the conflict is at most one: that is, one lobby prefers higher τ and the other prefers lower τ. Thus, the degree of the conflict is smaller under the regime of administered protection than under the regime of legislated protection. Therefore, either in the case of congruent interests or in the case of conflicting interests, under the administered protection regime, the lobbies need to pay less contribution to the government, in order to achieve the same protection policy under the legislated protection regime. Hence, the lobbies enjoy higher net payoffs under the regime of administered protection. In other words, administered protection is an institutional setting where the choice of the government, thus the leeway of the interest groups to lobby, is restricted to one dimension. Such a restriction makes the lobbies better off, since it works for them as a commitment device to eliminate, or to reduce the degree of conflicting interests between them.

Next, we present another special case where $\alpha_M = 1$.

Proposition 3 *If $\alpha_M = 1$, then $n_1^A > n_1^L$ and $n_2^A > n_2^L$.*

Proof. If $\alpha_M = 1$, then $\mathbf{t}^L = \mathbf{t}^A = \mathbf{0}$. So,

$$\begin{aligned}
& \mathcal{A} - (\mathcal{A}_1 + \mathcal{A}_2) \\
= \quad & \left[V_1(\mathbf{t}^{A,1}) + aW(\mathbf{t}^{A,1})\right] - \left[V_1(\mathbf{t}^{A}) + aW(\mathbf{t}^{A})\right] + \left[V_2(\mathbf{t}^{A,2}) + aW(\mathbf{t}^{A,2})\right] - \left[V_2(\mathbf{0}) + aW(\mathbf{0})\right] \\
& + \left[V_2(\mathbf{0}) - V_2(\mathbf{t}^{A})\right] \geq 0.
\end{aligned}$$

Thus, $n_1^A = \mathcal{A}_1$ and $n_2^A = \mathcal{A}_2$. Now,

$$\begin{aligned}
\mathcal{A}_1 - \mathcal{L}_1 &= \left[V_2(\mathbf{t}^{L,2}) + aW(\mathbf{t}^{L,2})\right] - \left[V_2(\mathbf{t}^{A,2}) + aW(\mathbf{t}^{A,2})\right] > 0, \\
\mathcal{A}_2 - \mathcal{L}_2 &= \left[V_1(\mathbf{t}^{L,1}) + aW(\mathbf{t}^{L,1})\right] - \left[V_1(\mathbf{t}^{A,1}) + aW(\mathbf{t}^{A,1})\right] > 0.
\end{aligned}$$

Therefore, $n_1^A > n_1^L$ and $n_2^A > n_2^L$. ■

As we argued in the preceding paragraph, the administered protection regime may be preferred by the lobbies, since it reduces the degree of the conflict between them. From this observation, we can expect that the more intense conflict of the interests between the lobbies are, the larger the advantage of the administered protection regime in reducing the degree of the conflict, and thus the more likely the lobbies are to prefer the administered protection regime. Note that the conflict between the lobbies comes from positive α_i in our model: that is, if $\alpha_i > 0$, lobby i has an interest in trade policy not only as a producer but also as a consumer. In the extreme case where α_M is the largest, i.e., $\alpha_M = 1$, the administered protection regime should be preferred by the lobbies. Proposition 3 shows this intuition is indeed correct.

Based on the special-case results presented in Proposition 2 and 3, now we proceed to consider general cases where $\delta_2/\delta_1 \neq t_2^L/t_1^L$ and $\alpha_M < 1$. Recall that the necessary and sufficient conditions that the lobbies prefer the administered protection regime are $\mathcal{A}_1 \geq \mathcal{L}_1$, $\mathcal{A}_2 \geq \mathcal{L}_2$, and $\mathcal{A} \geq \mathcal{L}_1 + \mathcal{L}_2$. The comparison of $\mathcal{A}$ and $\mathcal{L}_1 + \mathcal{L}_2$ gives

$$\mathcal{A} - (\mathcal{L}_1 + \mathcal{L}_2) = \{\mathcal{L} - (\mathcal{L}_1 + \mathcal{L}_2)\} - \{\mathcal{L} - \mathcal{A}\}, \tag{7}$$

where

$$\mathcal{L} - \mathcal{A} = \left[V_1(\mathbf{t}^L) + V_2(\mathbf{t}^L) + aW(\mathbf{t}^L)\right] - \left[V_1(\mathbf{t}^A) + V_2(\mathbf{t}^A) + aW(\mathbf{t}^A)\right].$$

And, the comparison of $\mathcal{A}_i$ and $\mathcal{L}_i$ gives

$$\mathcal{A}_i - \mathcal{L}_i = \left\{\left[V_j(\mathbf{t}^{L,j}) + aW(\mathbf{t}^{L,j})\right] - \left[V_j(\mathbf{t}^{A,j}) + aW(\mathbf{t}^{A,j})\right]\right\} - \{\mathcal{L} - \mathcal{A}\} \tag{8}$$

where $i \neq j$. For equation (7), the first braced term is positive as long as $\alpha_M > 0$ (see Lemma 1). For equation (8), the first braced term is positive since $V_j(\mathbf{t}^{L,j}) + aW(\mathbf{t}^{L,j})$ is the unconstrained maximum while $V_j(\mathbf{t}^{A,j}) + aW(\mathbf{t}^{A,j})$ is a constrained maximum. The second braced term in equation (7) and equation (8), $\{\mathcal{L} - \mathcal{A}\}$, is nonnegative because $V_1(\mathbf{t}^L) + V_2(\mathbf{t}^L) + aW(\mathbf{t}^L)$ is the unconstrained maximum while $V_1(\mathbf{t}^A) + V_2(\mathbf{t}^A) + aW(\mathbf{t}^A)$ is a constrained maximum. Thus, (7) and (8) are positive if the first braced term in each equation is larger than $\mathcal{L} - \mathcal{A}$. In Proposition 2, we showed that $\mathcal{L} = \mathcal{A}$ if $\delta_2/\delta_1 = t_2^L/t_1^L$, and we concluded that equation (7) and (8) are positive. From this observation, we can infer the following: even when $\delta_2/\delta_1 \neq t_2^L/t_1^L$, equation (7) and (8) can be positive if δ_2/δ_1 is close enough to t_2^L/t_1^L so that $\mathcal{L}$ is close enough to $\mathcal{A}$. More specifically, for given $\alpha_M > 0$, we can find a range of δ_2/δ_1, centered at t_2^L/t_1^L, within which $\mathcal{L}$ is close enough to $\mathcal{A}$ so that equation (7) and (8) are positive. Furthermore, we expect that such a range of δ_2/δ_1 becomes wider as α_M increases, since, as we discussed in Proposition 3, more intense conflict between the lobbies implies that the administered protection regime is more likely preferred by the lobbies. Proposition 4 formalizes this idea, and Figure 4 gives a numerical example.

Proposition 4 *Suppose that $\alpha_1 = \alpha_2 = \alpha$, where $0 \leq \alpha \leq 1/2$. For any given $\alpha > 0$, there exists a range of δ_2/δ_1 within which $\mathcal{A}_1 > \mathcal{L}_1$, $\mathcal{A}_2 > \mathcal{L}_2$, and $\mathcal{A} > (\mathcal{L}_1 + \mathcal{L}_2)$ hold. The range of δ_2/δ_1 increases as α increases.*

Proof. See Appendix C. ■

Proposition 2, 3, and 4 together say that the lobbies are more likely to prefer administered protection to legislated protection when δ_2/δ_1 is closer to t_2^L/t_1^L, and when α_M is larger. This can be understood by the following explanation. For the lobbies, there is a trade off when the regime is switched from legislated protection to administered protection. On one hand, when the regime is switched from legislated to administered protection, the total size of the "pie", $V_1(\mathbf{t}) + V_2(\mathbf{t}) + aW(\mathbf{t})$, which is shared out among the lobbies and the government, decreases. So, for the lobbies this is a disadvantage of the administered protection regime. On the other hand, when the regime is switched from legislated to administered protection, the conflict of the interests between the lobbies becomes less intense, thus the contributions they have to make in equilibrium decreases. For the lobbies this is an advantage of the administered protection regime. The lobbies will prefer the administered protection regime to the legislated protection regime if the former disadvantage is smaller than the latter advantage. Roughly speaking, the former disadvantage is small when δ_2/δ_1 is close to t_2^L/t_1^L, and the latter advantage is large when α_M is large.

To sum up, in this section we demonstrated that all lobbies can be made better off under the administered protection regime than under the legislated protection regime. So, the lobbies may be interested in letting the government to provide trade protection via administered protection. For example, if the choice of the protection regime were a political issue to be decided, the lobbies would support the politicians who advocate the administered protection regime. Thus, the administered protection can be emerged as a political equilibrium. We consider that this is a possible explanation why administered protection has become a preferred instrument of protection.

5 Welfare

In the previous section, we examined the equilibrium payoffs to the lobbies and discussed that all lobbies can be better off under the regime of administered protection. Now, in this section, we compare the welfare of the economy under two protection regimes. With a casual intuition, one may expect that the total welfare of the economy should be smaller under the administered protection regime, since there is a restriction on the choice of the trade policy under this regime. However, this intuition is not correct, since what the government maximizes is not the total welfare of the economy, W, but the weighted sum of the welfare of the import-competing sectors and the total welfare of the economy, $V_1 + V_2 + aW$. In fact, our analysis below shows that, with a fairly reasonable condition, the total welfare of the economy is larger under the administered protection regime than under the legislated protection regime. Therefore, the administered protection regime can be supported by the general public as well as the special interest groups. To facilitate the analysis, in this subsection we assume that the supply curves and demand curves are linear.

When the demand and supply curves are linear, we can have explicit solutions for the equilibrium tariffs. Under the regime of legislated protection, the equilibrium tariffs are given by

$$t_i^L = \frac{(1-\alpha_M)\,\bar{y}_i}{D_i} \text{ for } i = 1, 2 \tag{9}$$

where $\bar{y}_i = y_i(0)$ is the quantity supplied when the tariff is equal to zero, and $D_i = -(1-\alpha_M)\,y_i' - (a+\alpha_M)\,m_i' > 0$. On the other hand, the equilibrium tariffs under the regime of administered protection are given by

$$t_i^A = \tau^A \delta_i, \text{ where } \tau^A = \frac{(1-\alpha_M)\,[\bar{y}_1\delta_1 + \bar{y}_2\delta_2]}{D_1\delta_1^2 + D_2\delta_2^2}. \tag{10}$$

Now, we compare the total welfare of the economy under two regimes of protection. When the demand and supply curves are linear, the total welfare is quadratic. Thus, by a Taylor expansion,

$$W(\mathbf{t}^L) - W(\mathbf{t}^A) = t_1^A m_1'(t_1^L - t_1^A) + t_2^A m_2'(t_2^L - t_2^A) + m_1'\frac{(t_1^L - t_1^A)^2}{2} + m_2'\frac{(t_2^L - t_2^A)^2}{2}. \tag{11}$$

In general, $t_1^L - t_1^A$ and $t_2^L - t_2^A$ have the opposite signs (see Proposition 1): that is, when the regime is switched from legislated protection to administered protection, the tariff in one sector increases and the tariff in the other decreases. Thus, under which regime the total welfare is higher is ambiguous a priori. By substituting the expression of t_i^L and t_i^A into the first-order terms of equation (11), we derive

$$\begin{aligned} & t_1^A m_1'(t_1^L - t_1^A) + t_2^A m_2'(t_2^L - t_2^A) \\ = \; & \frac{(1-\alpha_M)^3\,\delta_1\delta_2(\bar{y}_1\delta_1 + \bar{y}_2\delta_2)\,[\bar{y}_1 D_2\delta_2 - \bar{y}_2 D_1\delta_1]\,(y_1' m_2' - y_2' m_1')}{D_1 D_2\left(D_1\delta_1^2 + D_2\delta_2^2\right)^2} \end{aligned} \tag{12}$$

Now, we have the following sufficient conditions for $W(\mathbf{t}^L) < W(\mathbf{t}^A)$.

Proposition 5 *1. If $\delta_i = 0$, then $W(\mathbf{t}^L) < W(\mathbf{t}^A)$.*

2. Suppose that $t_i^L > t_i^A$. Then, $W(\mathbf{t}^L) < W(\mathbf{t}^A)$ if $y_i' \left|d_j'\right| \geq y_j' \left|d_i'\right|$, where $i \neq j$.

Proof. From equation (11), we see that $W(\mathbf{t}^L) < W(\mathbf{t}^A)$ if the first-order terms $t_1^A m_1'(t_1^L - t_1^A) + t_2^A m_2'(t_2^L - t_2^A)$ is nonpositive, since the second-order terms are negative.

1. If $\delta_i = 0$, then it is immediately seen that the first-order terms are zero from equation (12).

2. Without loss of generality, suppose that $t_1^L > t_1^A$. Then, $t_2^L < t_2^A$ thus $\bar{y}_1 D_2 \delta_2 - \bar{y}_2 D_1 \delta_1 > 0$. Therefore, the first-order terms is nonpositive if $y_1' m_2' - y_2' m_1' \leq 0$. Noticing that $m_i' = d_i' - y_i'$, we get the result. ■

The intuition of Proposition 5-1 is quite obvious. From equation (9) and (10), it is seen that if $\delta_i = 0$, then $t_i^A = 0$ and $t_j^A = t_j^L$. Thus, in this case only sector j is protected by the administered protection policy, and the rates of protection in sector j are the same under two protection regimes. Therefore, the total welfare of the economy is higher under the administered protection regime.

Proposition 5-2 reveals that whether $W(\mathbf{t}^L) < W(\mathbf{t}^A)$ essentially depends on the relative slopes of demand and supply curves in two sectors. It states that, if a sector whose t falls when the regime is switched from the legislated to administered protection has a flatter supply curve or a steeper demand curve relative to the other sector, then $W(\mathbf{t}^L) < W(\mathbf{t}^A)$. To understand the intuition, suppose that $\bar{y}_i = \bar{y}_j$. First, consider that $\left|d_i'\right| = \left|d_j'\right|$. Then, $y_i' \geq y_j'$ implies $W(\mathbf{t}^L) < W(\mathbf{t}^A)$. This is because, when the supply curve of sector i is flatter than that of sector i, as the regime is switched from legislated protection to administered protection, the welfare gain from a decrease in t_i is larger than the welfare loss from an increase in t_j (recall that if $t_i^L > t_i^A$, then $t_j^L < t_j^A$). Thus, the total welfare increases as the regime is switched from legislated protection to administered protection. Second, consider that $y_i' = y_j'$. Then, $\left|d_j'\right| \geq \left|d_i'\right|$ implies $W(\mathbf{t}^L) < W(\mathbf{t}^A)$. This is because, when the demand curve of sector i is steeper than that of sector j, then D_i is smaller than D_j, thus t_i^L is larger than t_j^L. So, when the regime is switched from legislated protection to administered protection, a decrease in t_i (from t_i^L to t_i^A) is larger than an increase in t_j (from t_j^L to t_j^A). Therefore, the total welfare of the economy increases as the regime is switched from legislated protection to administered protection.

It should be noted that the condition given in Proposition 5-2 is fairly reasonable to be satisfied. For example, the condition is satisfied when two sectors are symmetric. Thus, combined with the result shown in the preceding section, we may well argue that the administered protection regime is supported not only by the special interest groups but also by the general public. Also, Proposition 5-1 buttresses our comment about real-world observations of administered protection policies. Typically, administered protection policies protect only a small number of the industries. As we argued earlier, even such an unbalanced administered protection policy may be preferred by all lobbies. In addition, the general public as well prefer the regime of the administered protection, since the overall protection is smaller under this regime.

6 Concluding Remarks

In this paper, we analyzed lobbying for administered protection in the framework of Grossman-Helpman, considering administered protection as an institutional form alternative to legislated protection. The main result of the paper is that special interest groups may prefer the regime of administered protection to the regime of legislated protection. This is because, by restricting trade policies only to administered protection, the lobbies can eliminate, or at least mitigate, the conflict of interests among themselves, thus they need to make less political contributions to the government. Also, we compared the total welfare of the economy under two protection regimes. We found that the total welfare can be larger under the administered protection regime, suggesting that the general public as well as the special interest groups prefer the administered protection regime.

Our analysis needs to be extended in several ways. First, we have to consider the case where not all import-competing sectors are organized. Although we claimed that there is no free-rider problems among organized sectors, there can be a free-rider problem between organized and unorganized sectors. Thus, it is interesting to endogenize formation of lobbies, as studied in Mitra (1999). Second, although we rather causally argued that the administered protection may be emerged as a political equilibrium, it may be necessary to explicitly model the choice of regime as the first stage of the game, followed by the lobbying game analyzed here. At the choice of the regime, it will be important to consider not just which regime, legislated or administered protection regime, is chosen, but also *what kind of* administered protection policy is chosen. If several kinds of administered protection policy are available, lobbies are not likely to support one policy unanimously, since different kinds of administered protection policy are likely associated with different sets of δ_i's. Finally, analyzing multilateral discipline on administered protection is important, since antidumping/countervailing duty policies are now one of the main issues negotiated at GATT/WTO meetings.

Appendix A: Proof of Lemma 1

To facilitate the proof of the lemma, here we present what $\mathbf{t}^L$, $\mathbf{t}^{L,1}$ and $\mathbf{t}^{L,2}$ look like.

$$t_1^L = \frac{1-\alpha_M}{a+\alpha_M}\frac{y_1(t_1^L)}{\left(-m_1'(t_1^L)\right)},\ t_2^L = \frac{1-\alpha_M}{a+\alpha_M}\frac{y_2(t_2^L)}{\left(-m_2'(t_2^L)\right)}$$

$$t_1^{L,1} = \frac{1-\alpha_1}{a+\alpha_1}\frac{y_1(t_1^{L,1})}{\left(-m_1'(t_1^{L,1})\right)},\ t_2^{L,1} = \frac{-\alpha_1}{a+\alpha_1}\frac{y_2(t_2^{L,1})}{\left(-m_2'(t_2^{L,1})\right)}$$

$$t_1^{L,2} = \frac{-\alpha_2}{a+\alpha_2}\frac{y_1(t_1^{L,2})}{\left(-m_1'(t_1^{L,2})\right)},\ t_2^{L,2} = \frac{1-\alpha_2}{a+\alpha_2}\frac{y_2(t_2^{L,2})}{\left(-m_2'(t_2^{L,2})\right)}$$

From (L_1), (L_2), and (L), we have

$$\begin{aligned} & \mathcal{L} - (\mathcal{L}_1 + \mathcal{L}_2) \\ = & \left[V_1(\mathbf{t}^{L,1}) + aW(\mathbf{t}^{L,1})\right] + \left[V_2(\mathbf{t}^{L,2}) + aW(\mathbf{t}^{L,2})\right] \\ & - \left[V_1(\mathbf{t}^L) + V_2(\mathbf{t}^L) + aW(\mathbf{t}^L)\right] - aW(\mathbf{0}) \end{aligned}$$

Notice that $V_i(\mathbf{t})$ and $W(\mathbf{t})$ are additively separable in t_i's. Define

$$\begin{aligned} v_{ii}(t_i) &= \pi_i(t_i) + \alpha_i\left[r_i(t_i) + s_i(t_i)\right] \\ v_{ij}(t_j) &= \alpha_i\left[r_j(t_j) + s_j(t_j)\right], i \neq j \\ w_i(t_i) &= \pi_i(t_i) + \left[r_i(t_i) + s_i(t_i)\right] \end{aligned}$$

Then,

$$\begin{aligned} V_1(\mathbf{t}) &= v_{11}(t_1) + v_{12}(t_2) \\ V_2(\mathbf{t}) &= v_{21}(t_1) + v_{22}(t_2) \\ W(\mathbf{t}) &= w_1(t_1) + w_2(t_2) \end{aligned}$$

Using these notations, we rewrite $\mathcal{L} - (\mathcal{L}_1 + \mathcal{L}_2)$ as follows:

$$\begin{aligned}
& \mathcal{L} - (\mathcal{L}_1 + \mathcal{L}_2) \\
= \ & \left[v_{11}(t_1^{L,1}) + aw_1(t_1^{L,1})\right] - \left[v_{11}(t_1^{L}) + aw_1(t_1^{L})\right] \\
& + \left[v_{21}(t_1^{L,2}) + aw_1(t_1^{L,2})\right] - \left[v_{21}(0) + aw_1(0)\right] \\
& + \left[v_{21}(0) - v_{21}(t_1^{L})\right] \\
& + \left[v_{12}(t_2^{L,1}) + aw_2(t_2^{L,1})\right] - \left[v_{12}(0) + aw_2(0)\right] \\
& + \left[v_{22}(t_2^{L,2}) + aw_2(t_2^{L,2})\right] - \left[v_{22}(t_2^{L}) + aw_2(t_2^{L})\right] \\
& + \left[v_{12}(0) - v_{12}(t_2^{L})\right]
\end{aligned} \tag{13}$$

By the definition of $t_1^{L,1}$ and $t_1^{L,2}$, the second and third lines of equation (13) is greater than or equal to zero. For the fourth line, note that $dv_{21}/dt_1 = -\alpha_2 y_1(t_1) + \alpha_2 t_1 m_1'(t_1) \leq 0$ for $t_1 \geq 0$. Since $t_1^L \geq 0$, the fourth line is nonnegative. Similarly, the fifth, the sixth, and the seventh lines are nonnegative. Therefore, $\mathcal{L} - (\mathcal{L}_1 + \mathcal{L}_2) \geq 0$.

Now, suppose that $\alpha_M = 0$. Then, $t_1^{L,1} = t_1^L$, $t_1^{L,2} = 0$, and $v_{21}(t) = 0$ for any t. Thus the second, the third, and the fourth lines of equation (13) are zero. Similarly, if $\alpha_M = 0$, Then, $t_2^{L,1} = 0$, $t_2^{L,2} = t_2^L$, and $v_{12}(t) = 0$ for any t. Thus the fifth, the sixth, and the seventh lines of equation (13) are zero as well. Therefore, $\mathcal{L} - (\mathcal{L}_1 + \mathcal{L}_2) = 0$. On the other hand, suppose that $\mathcal{L} - (\mathcal{L}_1 + \mathcal{L}_2) = 0$. This implies that each line of equation (13) is zero. For each line of equation (13) to be zero, it must be that $\alpha_M = 0$.■

Appendix B: Proof of Lemma 2

Necessity: Suppose $\mathcal{L}_1 + \mathcal{L}_2 > \mathcal{A}$. Since $\mathcal{L}_1 + \mathcal{L}_2 = n_1^L + n_2^L$ and $\mathcal{A} \geq n_1^A + n_2^A$, $\mathcal{L}_1 + \mathcal{L}_2 > \mathcal{A}$ implies that $n_1^L + n_2^L > n_1^A + n_2^A$. Suppose $\mathcal{L}_1 > \mathcal{A}_1$. Then, $n_1^L = \mathcal{L}_1 > \mathcal{A}_1 \geq n_1^A$. Similarly, $\mathcal{L}_2 > \mathcal{A}_2$ implies $n_2^L > n_2^A$. Therefore, $\mathcal{L}_1 \leq \mathcal{A}_1$, $\mathcal{L}_2 \leq \mathcal{A}_2$ and $\mathcal{L}_1 + \mathcal{L}_2 \leq \mathcal{A}$ are necessary for the existence of equilibrium such that $n_1^A \geq n_1^L$ and $n_2^A \geq n_2^L$.

Sufficiency: When $n_1^A = \mathcal{A}_1$ and $n_2^A = \mathcal{A}_2$, then $n_1^A = \mathcal{A}_1 \geq \mathcal{L}_1 = n_1^L$ and $n_2^A = \mathcal{A}_2 \geq \mathcal{L}_2 = n_2^L$. When $n_1^A + n_2^A = \mathcal{A}$, then $n_1^A + n_2^A = \mathcal{A} \geq \mathcal{L}_1 + \mathcal{L}_2 = n_1^L + n_2^L$. So, there is no equilibrium such that $n_1^A < n_1^L$ *and* $n_2^A < n_2^L$. Suppose that $n_2^A < n_2^L$ for any equilibria. However, we can construct a pair of equilibrium payoffs such that $n_1^A = \mathcal{A} - \mathcal{A}_2$ and $n_2^A = \mathcal{A}_2$. Then, $\mathcal{L}_2 = n_2^L > n_2^A = \mathcal{A}_2$. This contradicts the condition $\mathcal{L}_2 \leq \mathcal{A}_2$. Similarly, supposing $n_1^A < n_1^L$ for any equilibria leads to a contradicting statement $\mathcal{L}_1 > \mathcal{A}_1$.■

Appendix C: Proof of Proposition 4

First, consider $0 \leq \delta_2/\delta_1 \leq t_2^L/t_1^L$. Take $\mathcal{A} - (\mathcal{L}_1 + \mathcal{L}_2)$ as a function, whose arguments are δ_2/δ_1 and α. From Proposition 2 and 3, $\mathcal{A} - (\mathcal{L}_1 + \mathcal{L}_2)$ is strictly positive at $\delta_2/\delta_1 = t_2^L/t_1^L$ and $\alpha = 1/2$. Since $\mathcal{A} - (\mathcal{L}_1 + \mathcal{L}_2)$ is continuous on δ_2/δ_1 and α, we can find a point $\left((\delta_2/\delta_1)^*, \alpha^*\right)$ such that $\mathcal{A} - (\mathcal{L}_1 + \mathcal{L}_2) = 0$, and that $\mathcal{A} - (\mathcal{L}_1 + \mathcal{L}_2) > 0$ for any $\delta_2/\delta_1 > (\delta_2/\delta_1)^*$ and $\alpha > \alpha^*$ (if we cannot find such a point, then $\mathcal{A} - (\mathcal{L}_1 + \mathcal{L}_2) > 0$ for any $0 \leq \delta_2/\delta_1 \leq t_2^L/t_1^L$ and $0 \leq \alpha \leq 1/2$, so there is nothing to worry about).

The set of $\left((\delta_2/\delta_1)^*, \alpha^*\right)$ gives us a locus above which $\mathcal{A} - (\mathcal{L}_1 + \mathcal{L}_2) > 0$. The slope of the locus is found by the total differentiation

$$\frac{\partial \left[\mathcal{A} - (\mathcal{L}_1 + \mathcal{L}_2)\right]}{\partial \left(\delta_2/\delta_1\right)} d\left(\delta_2/\delta_1\right) + \frac{\partial \left[\mathcal{A} - (\mathcal{L}_1 + \mathcal{L}_2)\right]}{\partial \alpha} d\alpha = 0$$

where the partial derivatives are evaluated at $\left((\delta_2/\delta_1)^*, \alpha^*\right)$. By the definition of $\left((\delta_2/\delta_1)^*, \alpha^*\right)$, both partial derivatives are positive. Thus, the locus is negatively sloped.

The locus above which $\mathcal{A}_1 - \mathcal{L}_1 > 0$, and the locus above which $\mathcal{A}_2 - \mathcal{L}_2 > 0$ are found by the same procedure, and by the same reasoning it is shown that the slopes of these loci are negative. Then, we construct the upper envelope of these three loci (i.e., the locus above which $\mathcal{A} - (\mathcal{L}_1 + \mathcal{L}_2) > 0$, the locus above which $\mathcal{A}_1 - \mathcal{L}_1 > 0$, and the locus above which $\mathcal{A}_2 - \mathcal{L}_2 > 0$). Above this upper envelope, all of $\mathcal{A}_1 > \mathcal{L}_1$, $\mathcal{A}_2 > \mathcal{L}_2$, and $\mathcal{A} > (\mathcal{L}_1 + \mathcal{L}_2)$ hold, and this upper envelope is negatively sloped.

For $\delta_2/\delta_1 > t_2^L/t_1^L$, by the similar procedure we can construct the locus above which all of $\mathcal{A}_1 > \mathcal{L}_1$, $\mathcal{A}_2 > \mathcal{L}_2$, and $\mathcal{A} > (\mathcal{L}_1 + \mathcal{L}_2)$ hold, and it can be shown that this locus is positively sloped.■

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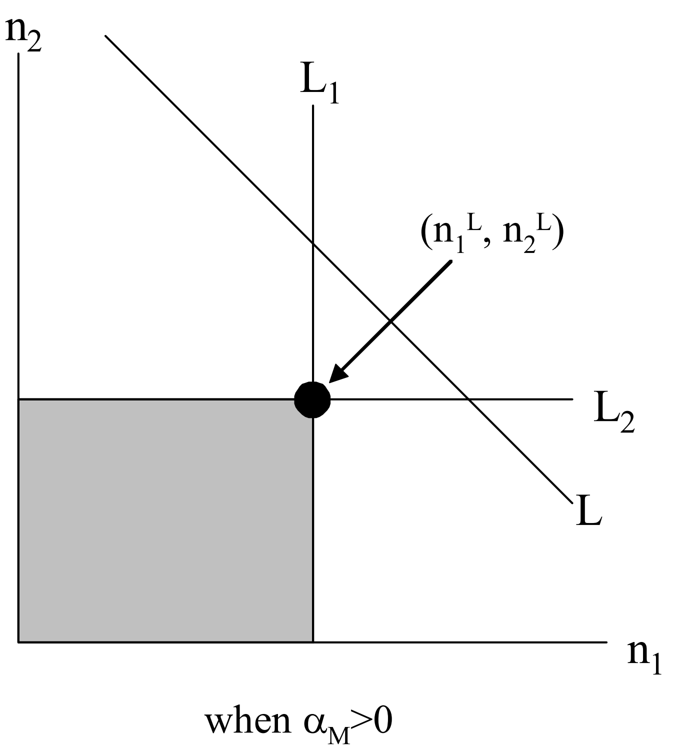


Figure 1: Equilibrium payoffs under the legislated protection regime

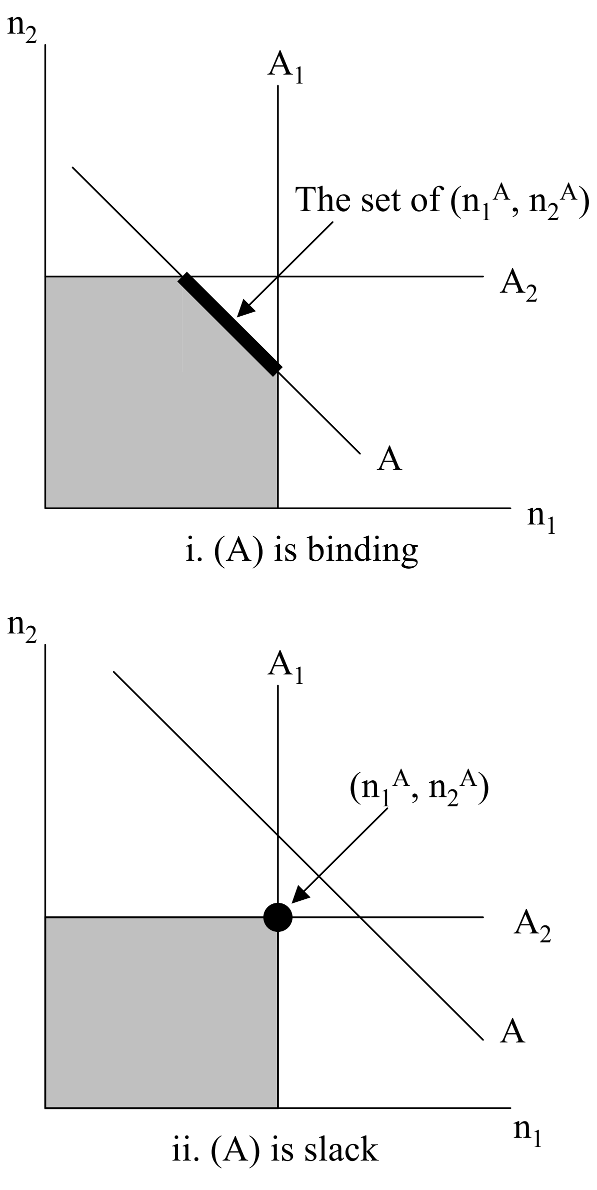


Figure 2: Equilibrium payoffs under the administered protection regime

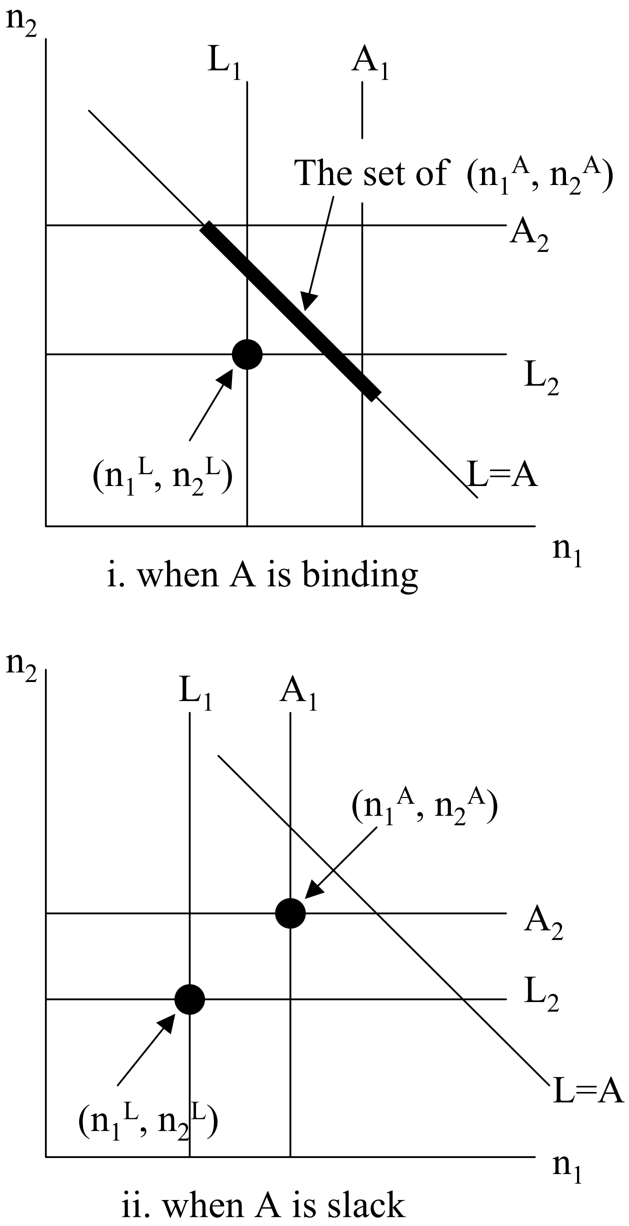
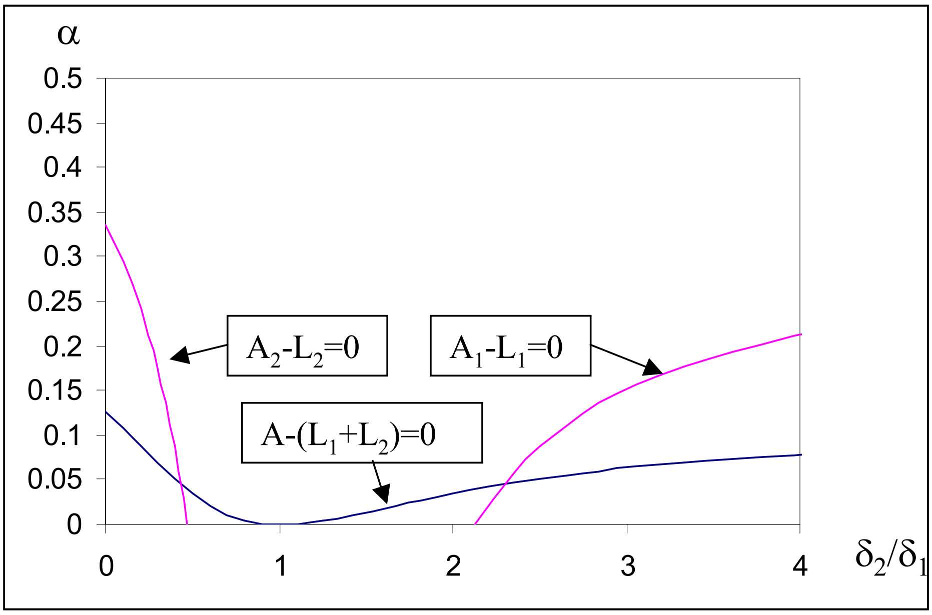


Figure 3: Proposition 2



•This graph is drawn assuming linear demand and linear supply curves. The parameter values are a=3, $y_1(0)$ = $y_2(0)$ = 10, m_1'= m_2' = -3, and y_1' = y_2' = -2.

•Since two sectors are symmetric here, t_2^L/ t_1^L =1.

• In this numerical example, A_1-L_1>0 for δ_2/δ_1<1, and A_2-L_2>0 for δ_2/δ_1>1.

Figure 4: An illustration of Proposition 4