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A Model of Substitution of Non-Tariff Barriers

by

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A Model of Substitution of Non-Tariff Barriers

for Tariffs

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Abstract

This paper suggests some coherent explanations for tariff reductions and substitution of non-tariff barriers for tariffs, taking into account both organized special interests and unorganized consumer interests. It focuses on how the presence of informed consumers affects the political equilibrium choice of trade policy. The paper identifies three effects that interact with each other as an incumbent government substitutes a NTB for a tariff and finds, among other things, that an increase in foreign competition will not cause the government to substitute NTBs for tariffs but a rise in the government's valuation of political contribution might. *JEL classification:* F13, D72

"While the Kennedy Round negotiations led to a considerable reduction in tariff protection in these countries [the United States, Japan, the European Community and Canada], much of the liberalization which might have resulted was offset by the addition of NTBs, which were not covered by the negotiations."

—— Ray and Marvel (1984, p452)

1 Introduction

One of the most striking features of many industrialized nations' trade policies is the apparent substitution of non-tariff barriers (NTBs) for tariffs. During the past three decades, tariffs have undergone continuous reduction while, at the same time, various NTBs have been adopted, of which a large proportion are the outcomes of administrative action (such as anti-dumping).[1] A conventional explanation for this is that since tariffs were being cut and bound by successive rounds of GATT agreements, governments have had to use NTBs when demands for protection from import-competing industries arise.[2] But as Rodrik (1995) asks, why do governments still have the incentive to negotiate GATT agreements that they know they and others will be able to flout by resorting to NTBs? The conventional explanation is not complete and one reason for this is that most research focuses on the role of special interests in affecting the formation of government trade policies. This paper provides a model to suggest an explanation that focuses on the role of "informed consumers" and the relative transparency of different instruments of trade policy.

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A primary feature of the paper is that it accounts for the role of both organized special interests and unorganized consumer interests in the formation of trade policy. It uses a Nash bargaining approach to model the interaction between an incumbent government and an import-competing firm, in which political contributions from the firm are used as transfer payments for trade protection from the government.[3] This helps open the 'black-box' of lobbying (or the interaction between protected industries and governments) and also determines the weight of domestic firm's profits in the government's objective function. Although unorganized, it is assumed that some consumers understand the economic consequences of a protective trade policy and are also aware of the organized lobbying activities of firms. Since the presence of these "informed consumers" may have a negative impact on its overall political support, the incumbent government must find a balance between organized special interests and unorganized consumer interests.

The specific form of NTBs considered is a voluntary export restraint (VER). The paper illustrates the substitution of VERs for tariffs through the interaction of three effects: the "social welfare effect", the "lobbying effect" and the "informational effect". Among other things, it is shown that an incumbent government could have a unilateral incentive to reduce tariffs as well as substitute VERs for tariffs. The "political equilibrium tariff" will decrease as the tariff becomes more transparent and a sufficient increase in the transparency of the tariff induces the government to switch to a NTB. The model, however, also suggests that eventually VERs will be phased out. Surprisingly, an increase in foreign competition will not cause substitution of VERs for tariffs. Rather, it makes the tariff regime more attractive because the gain in political support from consumers outweighs the political loss from the domestic firm. Moreover, we find that a rise in the

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government's valuation of political contributions might cause the substitution of VERs for tariffs. In general an increase in this valuation will not only increase the equilibrium tariff but will also cause the government to substitute VERs for tariffs.

There are relatively few studies that examine a government's choice between tariffs and VERs rather than explain the substitution of VERs for tariffs. Hillman and Ursprung (1988) find VERs to be the equilibrium choice by both competing political parties in an electoral competition model where foreign interests can also make campaign contributions. Feenstra and Lewis (1991) find VERs to be the incentive-compatible solution to the choice of instruments by both domestic and foreign governments in a bilateral cooperative-bargaining game with asymmetric information. The interaction between protected domestic industries and governments, however, is not at center stage in any of these studies. The present paper can be viewed as developing further Rosendorff's (1996a,b) recent work on the interaction between a domestic firm and a domestic government. Like most studies, Rosendorff uses a reduced form for the government's objective function in which firm profit gets a different weight from consumer surplus, reflecting relative political strength of interest groups. This is crucial to the analysis, but is unfortunately exogenous - the model does not explain how interest groups can receive different weights. The present paper, however, introduces three forces in the government objective function: the traditional social welfare, political contributions and informational opposition to lobby-induced protection. The relative weight in the reduced form is derived from the Nash bargaining solution and the higher weight for firm' profit is driven by political contributions. Moreover, in contrast to Rosendorff, we focus on the role of both informed consumers and government politicians, and the substitution (rather than the choice) of

VERs for tariffs.

Copeland (1990) is another important contribution in explaining the substitution of one instrument of protection for another. In his model two countries are cooperative in reducing the level of a 'negotiable' instrument in anticipation of the subsequent non-cooperative use of a 'non-negotiable' instrument. He shows that reducing the level of 'negotiable' instruments leads to some substitution of less efficient 'non-negotiable' instruments. Nevertheless, the welfare of both countries is raised because high levels of protection are deterred by the high cost of 'non-negotiable' instruments. Based on a reciprocal-dumping framework of Brander (1981), Anderson and Schmitt (1999) recently use a more general political-support function to study the issues along the lines of Copeland but more importantly they are also able to capture the characteristics of a particular industry in the analysis. In contrast, the present paper focuses on the unilateral incentive in the substitution of NTBs for tariffs. While approaches that focus on bilateral/multilateral incentives could more directly link the emergence of NTBs to multilateral trade rounds, we believe that neither approach in isolation would allow us to fully understand the issue.

In summary, whilst the idea of using differences in policy transparency to explain the choice of NTBs over tariffs has appeared in the literature, it has never been formally modeled.[4] We specifically model the interaction between a domestic government and an import-competing industry/firm to study both the level of protection and the choice of policy instruments. The remainder of the paper is organized as follows. Section 2 provides a formal overview of the model. Section 3 analyzes trade protection under a tariff regime. Section 4 analyzes trade protection under a VER regime. Section 5 characterizes the equilibrium choice and the substitution of VERs for tariffs. Section 6 provides some

concluding remarks.

2 Protection and Political Opposition

Government and trade protection - To capture the oligopolistic nature of many protected industries [see Ray and Marvel (1984)], we assume that a domestic firm and a foreign firm produce a homogenous good in the domestic market under Cournot competition. The protection of the domestic firm can be achieved through tariffs or VERs. Notice that although protection always benefits the domestic firm, not all protection would be 'lobby-driven' because of imperfect competition (e.g. an optimum tariff). However, the domestic firm has an incentive to lobby for more protection whenever possible.

An incumbent government cares about political support, which depends on the level of (net) social welfare, political contributions and "political opposition to protection". More specifically, the political-support function, G, is given by

$$G = (W - C, C, B), \tag{1}$$

where W is the conventional measure of social welfare, C represents political contributions from the domestic firm, and B is the "political opposition to protection", to be defined below. Since $W - C$ represents net social welfare, it is implied that political contributions are socially wasted by politicians in political campaigns to swing votes.

Following Grossman and Helpman (1994), we choose an additive form for the political-support function,

$$G = (W - C) + a_1 C + a_2 B$$

$$= W + (a_1 - 1)C + a_2B, \ a_1 > 1, \ a_2 < 0. \tag{2}$$

While the parameter a_2 represents the negative impact on the government's support due to political opposition, the parameter a_1 indicates how the government values political contributions (or the 'value' of political contributions) relative to social welfare. As in Grossman and Helpman, $a_1 > 1$ means government politicians value \$1 worth of political contributions more highly than \$1 in the hands of the public. Therefore, $a_1 - 1$ represents the net benefit for the government of receiving \$1 of political contributions.

"Political opposition to protection" -   Any kind of protection that leads to a higher domestic price will reduce political support from consumers, which is reflected in the reduction of consumer welfare in this model. Apart from this, consumers may not have any other reasons to oppose protection of domestic industries if they believe that governments act in the national interests (e.g., an optimum tariff that maximizes social welfare).[5] However, for those consumers who are informed in the sense that they know when protection is lobby-induced, there is *extra* opposition to the government.

Figure 1 goes here

In Figure 1 the universal set U represents the total population of all consumers and the "informed consumers" can be characterized as follows. Set T is the population that understands the negative economic impact of tariffs and set L is the population that is aware of the organized lobbying activities of firms. The intersection, α^τ, is the population of informed consumers under a tariff regime. Similarly, set α^v, the intersection of V and L, is the population of informed consumers under a VER regime, where set V is the population that understands the negative economic impact of VERs. Throughout the

paper we use τ and v to denote variables in a tariff and a VER regime, respectively. Notice that since α^τ and α^v become zero when set L is nil,[6] the informed consumers are those who are informed of lobby-induced protection.

It will be clear later that a benevolent government would never deviate from the optimum tariff that maximizes social welfare. Therefore we define the following "political opposition to protection" function (denoted by B) to capture this extra opposition to lobby-induced protection from informed consumers:

$$B = \alpha^i V(p - p(t^*)), \; [V(0) = 0; \; V' > 0 \text{ if } p > p(t^*) \text{ and } V' \leq 0 \text{ otherwise}], \; i = \tau, v, \; (3)$$

where p is the current price in the domestic market and $p(t^*)$ is the price under the optimum tariff t^* to be derived below. When the level of protection is higher than the optimum tariff, political support from consumers decreases due to lower consumer surplus. In addition, however, informed consumers will have extra opposition if the protection is lobby-induced and this is represented by $B > 0$. When the level of protection is lower than the optimum tariff, consumers gain from a lower domestic price and this will be reflected in the political support through higher consumer surplus. However, in this model the informed consumers would not give extra political support to the government for doing this. Rather, they might have extra opposition because governments do not maximize social welfare (especially when re-distribution of income is possible). It will be clear later that in equilibrium $t \geq t^*$.

Clearly there could be several ways to model consumers' opposition to protection. The definition of B is certainly very simple, but it addresses the informational opposition to lobby-induced protection. Together with the consumer surplus, we believe that it is able

to capture the concept of political opposition to protection from unorganized consumers.

The game - Trade protection is modeled as a three-stage game depicted in Figure 2. Starting from a tariff regime, in the first stage the domestic government (DG) decides either to keep the tariff or to initiate a VER agreement with a foreign government. In the second stage the domestic government (DG) and the domestic firm (DF) bargain over the level of firm's political contributions and trade protection, taking the policy regime as given. In the last stage, the domestic firm (DF) and the foreign firm (FF) compete in the domestic market, taking the government trade policy as given.

Figure 2 goes here

In principle VERs are the outcome of negotiations by two governments, in practice, however, VER agreements are overwhelmingly initiated by a domestic government. A foreign government often just represents the firms of its own country in the negotiation. Therefore, we assume that in this model the foreign government has the same objective function as has the foreign firm and will accept any proposal as long as the profit of the foreign firm is not reduced. To keep our analysis focused, the foreign domestic politics does not appear in the model.

The domestic government's equilibrium choice of policy regime can be obtained by solving this three-stage game through backward induction. We will first solve the last two stages of the game under the different policy regime respectively and then solve the first stage.

3 Protection Under a Tariff Regime

3.1 Stage Three: Competition between the Domestic and Foreign Firms

As in Brander and Spencer (1984), we assume that domestic demand is derived from an aggregate utility function of the general quasi-linear form $U = u(X) + m$ $(u' > 0,\ u'' < 0)$,[7] where m represents consumption of a competitively produced numeraire good and X represents consumption of the duopoly good: $X = y + x$. The output of the domestic firm is y and that of the foreign firm is x. The inverse demand function can be written as $p = p(X)\ (= u'(X))$. Therefore the profit functions of the domestic and foreign firms are, respectively,

$$\pi = yp(X) - ky - F$$

and

$$\pi^* = xp(X) - k^*x - tx - F^*,$$

where k and k^* are the respective marginal costs, F and F^* are the respective fixed costs, and t is the domestic tariff imposed on the foreign good under the tariff regime.

The domestic and foreign firms engage in Cournot competition in the domestic market, taking the domestic tariff as given. The first-order conditions for y and x are,

$$yp' + p - k = 0 \tag{4}$$

and

$$xp' + p - k^* - t = 0. \tag{5}$$

These two conditions characterize the reaction functions of the domestic and foreign firms to each other's output in the domestic market. If the second-order and stability conditions for the Nash equilibrium levels of output are satisfied, then these two equations implicitly yield output levels as functions of the domestic tariff $y(t)$ and $x(t)$. Moreover, equilibrium profits are $\pi(t) = \pi(y(t), x(t))$ and $\pi^*(t) = \pi^*(x(t), y(t), t)$ and the equilibrium domestic price is

$$p(t) = p(y(t) + x(t)). \tag{6}$$

It is easy to show that $\pi_t > 0$, $\pi_t^* < 0$ and $p_t > 0$ if the tariff is non-prohibitive. All subscripts denote derivatives (e.g., $\pi_t \equiv d\pi/dt$).

While it imposes a domestic cost by distorting the domestic market, the tariff shifts some foreign profit from the foreign firm to the domestic firm and to domestic government treasury. The optimum tariff (i.e. the "optimal profit-shifting tariff") that maximizes social welfare is given by

$$t^* = \frac{(1 - p_t)x + (p - k)y_t}{-x_t}. \tag{7}$$

On the other hand, since it always benefits from a higher tariff, the domestic firm may solicit the government for further trade protection. The government may also solicit the firm for political contributions. Therefore, the firm and government have incentives to collaborate.

3.2 Stage Two: Bargaining between the Domestic Firm and Government

Although collusion between politicians and special interests is illegal in most political systems, the bargaining between the domestic firm and government need not be explicit. In that sense the spirit of the bargaining approach is similar to that of the political-contribution approach of Grossman and Helpman (1994). In fact, the equilibrium level of protection obtained by the Nash bargaining solution in this paper is equivalent to that obtained by the menu-auction mechanism in the political-contribution approach. The former is easier in dealing with just one interest group but the latter is more useful and can handle problems with many interest groups. Both approaches are superior to the reduced-form approach because the government's objective is derived from a more primitive structure.

Consider first the equilibrium in which the government and firm do not collaborate. The outcome determines the threat point for bargaining. When there is no lobbying, the government's political support function reduces to

$$G = W + a_2 B$$

because $C = 0$. Using (3), it is straightforward to show that the threat-point level of tariff protection is equal to the optimum tariff t^*. The threat-point benefits are $W(t^*)$ for the government and $\pi(t^*)$ for the firm.

Under a tariff regime, when the firm and government bargain from the threat-point outcome, the net gain for the firm is $\pi(t) - C - \pi(t^*)$ and the net gain for the government

is $G - W(t^*)$. The Nash bargaining solution solves the following maximization problem:

$$\max_{C,t} \ [\pi - C - \pi(t^*)]^\beta [G - W(t^*)]^{1-\beta}, \ 0 < \beta < 1,$$

where β represents the bargaining power of the domestic firm relative to the government.

Proposition 1 *The political equilibrium tariff t^τ is characterized as follows:*[8]

$$t^\tau = \begin{cases} t^* + [(a_1 - 1)\pi_t + a_2\alpha^\tau V'p_t]/[-x_t] & , \ \textit{if } (a_1 - 1)\pi_t + a_2\alpha^\tau V'p_t > 0 \ \textit{at } t^*; \\ t^* & , \ \textit{if } (a_1 - 1)\pi_t + a_2\alpha^\tau V'p_t < 0 \ \textit{at } t^*, \end{cases} \tag{8}$$

where t^* is the optimum tariff given in (7).

Proof. See Appendix.

When $(a_1 - 1)\pi_t + a_2\alpha^\tau V' < 0$ at t^*, Nash bargaining does not lead to a deal between the firm and government. The political equilibrium tariff is therefore the same as the optimum tariff. The reason for this is that, even if the firm offers the government the entire additional profit as the result of an increase in the tariff, it cannot compensate the government's loss of political support enough to induce it to raise the tariff above t^*. Whether Nash bargaining leads to a deal or not depends on: firstly, how much the government can benefit from a political contribution $(a_1 - 1)$; secondly, the size of the firm's economic stake (π_t) in there being a higher tariff; and thirdly, the aggregate negative impact on government political support $(a_2\alpha^\tau V'p_t)$.

If instead $(a_1 - 1)\pi_t + a_2\alpha^\tau V'p_t > 0$ at t^*, then the firm is able to provide a political contribution that can sufficiently compensate the government for its loss of political support from informed consumers. Hence the equilibrium tariff t^τ is higher than the optimum tariff. The reason for t^* being the benchmark is that we have only a domestic import-competing industry in the model. The benchmark tariff rate would be lower,

for example, if we included a domestic exporting industry, which we did not in order to keep our analysis focused. Therefore, interpretations of the results should be taken more broadly rather than relying on the specific benchmark tariff rate.

In contrast to the equilibrium political contribution [see (20) in the appendix], the level of the political equilibrium tariff is independent of the firm's bargaining power. The reason for this is that, since political contributions can act as transfer payments to redistribute benefits from one party to another, the objective of the political equilibrium tariff is to maximize the two parties' joint benefits $J(t)$,

$$J(t) = W(t) + a_2 \alpha^\tau V(p(t) - p(t^*)) + (a_1 - 1)\pi(t), \tag{9}$$

as shown in the appendix. From this objective function, we can see that the weight attached to the domestic firm's profit is a_1, which is greater than that in the objective function determining the optimum tariff. The domestic firm's profit acquires this higher weight at the cost of paying the equilibrium political contribution C^τ.

Unlike the optimum tariff, the political equilibrium tariff t^τ responds to changes in domestic politics as shown in the following proposition.

Proposition 2 *An increase in informed consumers under the tariff regime (α^τ) pushes down the political equilibrium tariff; an increase in government's valuation of political contribution (a_1) pushes up the political equilibrium tariff.*

Proof. See Appendix.

It is not surprising that an increase in α^τ lowers the political equilibrium tariff, since the cost of protection imposed on the government is higher. This result, however, implies that domestic political factors could lead to a unilateral tariff reduction. Moreover, it

can be shown that the equilibrium government's political support G^τ decreases as α^τ increases. Therefore, the government will search for a new policy to replace the tariff when α^τ becomes large. We will return to this again in Section 5.

4 Protection Under a VER Regime

4.1 Stage Three: Competition between the Domestic and Foreign Firms

For a given level of foreign output x, (4) indicates that the domestic firm's equilibrium output and profit only depend on x: $y = y(x)$ and $\pi(x) = \pi(y(x), x)$. Furthermore, the market price also depends on x,

$$p(x) = p(y(x) + x). \tag{10}$$

It is easy to show that a reduction in x would increase p, raise π and lower π^*. Since restricting foreign output increases domestic profit, the domestic firm and government have an incentive to collude.

A VER is defined similarly to that in Rosendorff (1996b). With the tariff regime as the status quo, the domestic government asks the foreign government to restrict the output of the foreign firm from $x(t^\tau)$ to x. In return the domestic government promises to lower the tariff from t^τ to t^v. The lower tariff t^v is chosen such that the profit of the foreign firm is not lower under the VER regime than under the status quo tariff regime: $\pi^*(t^v, x) \geq \pi^*(t^\tau)$. This requirement makes a VER different from a domestic import quota.[9] The deal will therefore be accepted by the foreign government as long as the

foreign firm is no worse off.

4.2 Stage Two: Bargaining between the Domestic Firm and Government

As in the second stage under the tariff regime, consider first the threat-point equilibrium in which the domestic government and firm do not collaborate. In the absence of collaboration, the domestic government solves the following problem.

$$\max_{x,t} \ W(x) \ = \ u(X) - pX + \pi + tx$$

$$s.t. \qquad \pi^*(t, x) \geq \pi^*(t^\tau).$$

Lemma 1 *The threat-point outcome of the VER regime is equivalent to that of the tariff regime (i.e., the optimum tariff).*

Proof. See Appendix.

The intuition of Lemma 1 is as follows. At the threat point, the government's objective function becomes the social welfare function. The optimal tariff t^* that is chosen to maximize social welfare has already balanced the gain of the sum of the domestic firm's profit and government tariff revenue against the loss of consumers' surplus at the margin. A VER that deviates from this equilibrium would lower social welfare because it distorts this balance. The equivalence in the threat point between the two regimes also comes from the fact that tariffs and quantitative restrictions are equivalent under Cournot equilibrium [see Hwang and Mai (1988)].[10] Notice that Lemma 1 also implies that a benevolent government would never substitute a VER for a tariff.

The Nash bargaining process under the VER regime is similar to that under the tariff regime. After the government decides to switch to the VER regime, bargaining takes place from the threat-point outcome. The net gain for the domestic firm is $\pi(x) - C - \pi(t^*)$ and the net gain for the government is $G - W(t^*)$. It is easy to show that the equilibrium VER from the Nash bargaining solution, x^v, is given by

$$x^v = \frac{(p - k)y_x + t^v + (a_1 - 1)\pi_x + a_2\alpha^v V'p_x}{p_x - t_x^v}, \tag{11}$$

where t^v is a function of x because the domestic government will always increase t^v until the constraint, $\pi^*(t^v, x) \geq \pi^*(t^\tau)$, is binding.

Equivalently, x^v is chosen to maximize the two parties' joint benefits $J(x)$, where

$$J(x) = W(x) + a_2\alpha^v V(p(x) - p(t^*)) + (a_1 - 1)\pi(x). \tag{12}$$

As with Proposition 2, it is easy to show that the equilibrium VER x^v is increasing in α^v but decreasing in a_1.

5 Relative Transparency, Choice of Protection and Substitution

As discussed by Lloyd and Falvey (1986) and Hillman (1989), in general tariffs are far more transparent to the public than NTBs. Tariffs provide an explicit expression of the increase in domestic price, but the protective effects of quantitative restrictions are not immediately discernible to the losers from protectionist policies. Though there are studies that measure implicit tariff rates for many NTBs, they are not readily available to, or

understood by, the general public. VERs have tended to be even more obscure than tariffs because it appears to be foreign governments that restrict exports by their firms – the responsibility for restricting trade is not associated with domestic governments. Therefore, it is probably reasonable to assume that V is a subset of T. That is, as is illustrated in Figure 3, those consumers who understand the consequences of a VER also understand those of a tariff, but not vice versa. Since $V \subset T$, we have $\alpha^v < \alpha^\tau$. Also notice that since "transparency" in our discussion represents the degree of information in the public about a particular trade policy as in Hillman (1989, p73),[11] α^τ (α^v) can also be interpreted as an index of transparency of (or degree of information about) a tariff (VER).

Figure 3 goes here

Consider now the first stage in this three-stage game of trade protection. Here, the domestic government decides whether to keep using a tariff regime or to switch to a VER. The decision of course depends on which regime can deliver the highest political support for the government. As the next Lemma shows, however, this question reduces to determining which regime can provide the highest joint benefits for both the domestic firm and government.

Lemma 2 *Let G^τ and G^v denote equilibrium levels of political support under the tariff and VER regimes, respectively, then we have $G^v - G^\tau = (1 - \beta)[J(x^v) - J(t^\tau)]$.*

Proof. See Appendix.

The intuition behind Lemma 2 is clear if we recall two features of this model: first, under the Nash bargaining solution, only joint benefits are important because transfers

between two parties can be made internally; second, the threat points under the two regimes are the same. Therefore, the level of joint benefits can determine the government's equilibrium choice between the two regimes.

From Lemma 2, (9) and (12), we have

$$
\begin{aligned}
G^v - G^\tau \;=\; & (1-\beta)\{\underbrace{(W(x^v) - W(t^\tau))}_{(1/-)} + \underbrace{(a_1 - 1)[\pi(x^v) - \pi(t^\tau)]}_{(2/+)} + \\
& \underbrace{a_2[\alpha^v V(p(x) - p(t^*)) - \alpha^\tau V(p(t^\tau) - p(t^*))]}_{(3/?)}\}.
\end{aligned} \tag{13}
$$

This first term is the "social welfare effect", which is negative because the tariff creates less distortion in the economy than the VER. The second effect is the "lobbying effect", which is positive because the firm is able to provide more political contributions under the VER than under the tariff. The third term is the "informational effect" and its sign depends on the difference between the extra political oppositions from informed consumers in the two regimes. The manner in which these three effects interact with each other is illustrated in Figure 4.[12]

Figure 4 goes here

If α^v is close to α^τ, the informational effect is negative because $p(x^v)$ is higher than $p(t^\tau)$. The social welfare and informational effects dominate the political contribution effect. Therefore the government would prefer the tariff regime to the VER regime. However, if α^v is much smaller than α^τ, the informational effect would be positive. Then the political contribution and informational effects can dominate the welfare effect, and the government would prefer the VER regime to the tariff regime. The next proposition characterizes the government's equilibrium choice of trade protection regime.

Proposition 3

(i) The VER will never be chosen if $\alpha^v > \tilde{\alpha}^v$, where $\tilde{\alpha}^v$ satisfies $G^v(\tilde{\alpha}^v) = G^\tau(\alpha^\tau = 1)$;

(ii) when $\alpha^v < \tilde{\alpha}^v$ (say $\alpha^v = \alpha_o^v$), there exists a corresponding value of α^τ, $\tilde{\alpha}^\tau$, such that

> *(a) if $\alpha^\tau < \tilde{\alpha}^\tau$, political support is higher under the tariff regime;*

> *(b) if $\alpha^\tau > \tilde{\alpha}^\tau$ political support is higher under the VER regime,*

where $\tilde{\alpha}^\tau$ satisfies $G^\tau(\tilde{\alpha}^\tau) = G^v(\alpha^v = \alpha_o^v)$.

Proof. See Appendix.

A more general message from Part (i) of Proposition 3 is that, for a NTB to be a viable alternative to a tariff, it is not sufficient that the NTB only is less transparent than the tariff. There is a minimum requirement for the degree of transparency of the NTB that is based on the market distortion that it creates relative to the tariff.

Part (ii) of this proposition, together with Proposition 2, implies the following corollary that describes the substitution of the VER for the tariff.

Corollary 1 *An increase in the transparency of the tariff regime (α^τ) induces the incumbent government to lower the tariff; a sufficient increase in α^τ leads the government to substitute the VER for the tariff.*

For example, in Figure 4 when α^τ rises from α_A^τ, the tariff level and political support for the government decrease initially, but the government still prefers the tariff regime as long as $\alpha^\tau < \tilde{\alpha}^\tau$. However, when α^τ rises beyond $\tilde{\alpha}^\tau$, the government would switch to the VER regime.

When the government switches from a tariff to a VER, Protection at V is higher than at S but it is not necessarily higher than at A. Whether the overall protection becomes

higher or lower depends on the point at which we make the comparison. If A is close to S, the protection level under the tariff regime is lower than under the VER regime and hence overall protection is higher; otherwise, overall protection becomes lower. Therefore, our results are not inconsistent with the stylized fact that, except in a few sectors, net protection over time has decreased even with the emergence of NTBs.

From Section 4 we know that protection under a VER will also decrease when α^v become larger. But what can induce the government to continue to use the VER after it switches from a tariff regime to a VER Regime? Suppose both α^v and α^τ increase over time. For the government to stay in the VER regime, the following condition must be satisfied:

$$\frac{\partial (G^v - G^\tau)}{\partial \alpha^v} d\alpha^v + \frac{\partial (G^v - G^\tau)}{\partial \alpha^\tau} d\alpha^\tau \geq 0. \tag{14}$$

From (13) and the envelope theorem, (14) becomes

$$\frac{d\alpha^v}{d\alpha^\tau} \leq \frac{V(p(t^\tau) - p(t^*))}{V(p(x^v) - p(t^*))} (< 1). \tag{15}$$

Thus, while it is necessary for α^v to be smaller than α^τ for there to be a switch from the tariff regime to the VER regime, (15) says that it is also necessary that the change in α^v must be smaller than that in α^τ in order for the government to stay in the VER regime. When α^τ is close to its upper limit, it is likely that (15) would not hold. Therefore, this implies that the VER regime will eventually be phased out even when no new policy instrument is invented.

It is generally recognized that a reason for the emergence of most NTBs is that domestic governments have to meet the demand for protection from import-competing industries, resulting from increases in foreign competition. However, we will show that as

long as the underlying structure of this model does not change, an increase in foreign competition will not cause the government to substitute VERs for tariffs.

An increase in foreign competition can be represented by a decrease in the marginal cost of the foreign firm, k^*. We analyze the problem of how a decrease in k^* affects $G^\tau - G^v$ by examining all the effects that are first-order. From Lemma 2, we can write

$$\frac{d(G^\tau - G^v)}{dk^*} = (1 - \beta)[\frac{dJ(t^\tau)}{dk^*} - \frac{dJ(x^v)}{dk^*}].$$

Under the VER regime, since the level of foreign output is fixed at x^v, a decrease in k^* has no effect on consumer surplus and the profit of the domestic firm. Hence, the joint welfare of the domestic firm and government is unaffected, i.e., $dJ(x^v)/dk^* = 0$. Under the tariff regime, we can show that $dJ(t^\tau)/dk^* < 0$. The reason is as follows [see (4) and (5)]: a decrease in k^* has the same effects on two firms' output as does a decrease in the tariff, but the former has a more favorable effect on the tariff revenue because the tariff itself is not reduced. More specifically, it is straightforward to show that

$$\frac{dJ(t)}{dt} \mid_{t=t^\tau} = \frac{dJ(t^\tau)}{dk^*} + x. \tag{16}$$

Since the left-hand side of (16) is equal to zero, we have $dJ(t^\tau)/dk^* < 0$. Therefore, we obtain

$$\frac{d(G^\tau - G^v)}{dk^*} < 0. \tag{17}$$

Although the government colludes with the domestic firm, this result says that an increase in foreign competition will not cause the government to substitute VERs for tariffs as long as the underlying structure is unchanged.

In Section 3 we have shown that a rise in the government's valuation of political contribution (a_1) raises the level of the political equilibrium tariff. In addition it is straight-

forward to show that it might also cause the government to substitute VERs for tariffs. We summarize these results in the following proposition.

Proposition 4 *An increase in foreign competition will not cause the government to substitute VERs for tariffs; a rise in the government's valuation of political contribution (a_1) might do.*

Proof. See Appendix.

The intuition for these results can be understood clearly by recalling two earlier observations. First, a rise in a_1 increases the weight attached to the domestic firm's profit in the joint benefit function [(9) and (12)]. Consequently, the level of protection that the firm receives under both regimes will be higher. Second, the domestic firm earns relatively high profit under the VER regime. Therefore, a rise in a_1 tips the balance in favor of the VER regime. A fall in a_1 has just the opposite effect. As was shown above, a benevolent government (when $a_1 \rightarrow 1$) would never choose the VER.

While it has been recognized that administered protection is the result of the political pressure from import-competing industries [e.g., as in Rosendorff (1996a)].[13] In this paper, however, administered protection can result directly from an increase in the valuation of political contributions alone.

6   Concluding Remarks

This paper has suggested a coherent explanation for both the reduction of tariffs and substitution of NTBs for tariffs. Focusing on the unilateral incentive to reduce tariffs

and substitute tariffs with NTBs is not inconsistent with the observation that most tariff reductions have been multilateral in character. When domestic political interaction is not observable to foreign governments, each government would certainly take advantage of this informational asymmetry to seek multilateral tariff reductions. On the other hand, such unilateral incentive might become more easily reflected in its trade policy if a country is relatively isolated from the world trading system.[14]

Although unorganized consumer interests have played an important role in this model, they have not been overemphasized to the extent that their interests receive a smaller weight relative to organized special interests in the government objective function. The result that the political equilibrium tariff is higher than the optimum tariff reflects this imbalance between organized special interests and unorganized interests. The essential question is not whether firms or consumers have a stronger impact on government trade policies, but whether the presence of informed consumers is taken into account by incumbent governments. Given that consumers are the electorate that delivers political support to incumbent governments, it is quite reasonable to expect that these unorganized interests would be accounted for.

Finally, focusing on opposition to protection from informed consumers does not mean that they are more important forces than other anti-protection groups, e.g., export industries. While changes in the political balance of opposite interest groups could explain the long-run cycle that protectionism and free-trade policy succeed one another [as in Cassing, et al (1986)], focusing on opposition from informed consumers can help better understand a particular substitution of NTBs for tariffs and the reason why at the same time governments may still have incentives to negotiate agreements on tariff reductions.

Appendix

Proof of Proposition 1: Nash bargaining between the domestic firm and government solves the following problem:

$$\max_{C,t}\{\pi(t)-C-\pi(t^*)\}^\beta\{u(X)-pX+\pi(t)+tx+a_2\alpha^\tau V(p(t)-p(t^*))+(a_1-1)C-W(t^*)\}^{1-\beta}.$$

After taking derivatives, we can obtain the following two first-order conditions:[15]

$$(a_1-1)(1-\beta)\{\pi(t)-C-\pi(t^*)\}-$$

$$\beta\{u(X)-pX+\pi(t)+tx+a_2\alpha^\tau V+(a_1-1)C-W(t^*)\}=0, \qquad (18)$$

and

$$-Xp_t+\pi_t+x+tx_t+a_2\alpha^\tau V'p_t+(a_1-1)\pi_t=0. \qquad (19)$$

Noticing that $\pi_t=(p-k)y_t+yp_t$, from (18) and (19) we can derive the equilibrium tariff t^τ and political contribution C^τ:

$$t^\tau=\frac{(1-p_t)x+(p-k)y_t+(a_1-1)\pi_t+a_2\alpha^\tau V'p_t}{-x_t}$$

and

$$C^\tau = (1-\beta)[\pi(t^\tau)-\pi(t^*)]+$$

$$\frac{\beta}{(a_1-1)}[W(t^*)-W(t^\tau)-a_2\alpha^\tau V(p(t^\tau)-p(t^*))]. \qquad (20)$$

Proof of Proposition 2: After totally differentiating (19), it is found that

$$\frac{dt^\tau}{d\alpha^\tau}=\frac{H_{t\alpha^\tau}}{-H_{tt}}=\frac{a_2V'p_t}{-H_{tt}},$$

where $H_t\equiv -Xp_t+\pi_t+x+tx_t+a_2\alpha^\tau V'p_t+(a_1-1)\pi_t$. The second-order conditions for the maximization require $H_{tt}<0$. Therefore, $dt^\tau/d\alpha^\tau<0$.

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Similarly, it can be shown that

$$\frac{dt^\tau}{da_1} = \frac{H_{ta_1}}{-H_{tt}} = \frac{\pi_t}{-H_{tt}} > 0.$$

It can also be shown that G^τ is decreasing in α^τ. The equilibrium level of political support is

$$G^\tau = W(t^\tau) + a_2\alpha^\tau V(p(t^\tau) - p(t^*)) + (a_1 - 1)C^\tau.$$

Therefore, we have

$$\frac{dG^\tau}{d\alpha^\tau} = (W_t + a_2\alpha^\tau V'p_t)\frac{dt^\tau}{d\alpha^\tau} + a_2V(p(t^\tau) - p(t^*)) + (a_1 - 1)\frac{dC^\tau}{d\alpha^\tau}. \tag{21}$$

From (20) we obtain

$$(a_1-1)C^\tau = \{W(t^*)-[W(t^\tau)+a_2\alpha^\tau V(p(t^\tau)-p(t^*))]\}+(1-\beta)\{J(t^\tau)-[W(t^*)+(a_1-1)\pi(t^*)]\}.$$

Using the envelope theorem, it is found that

$$\begin{aligned}
(a_1 - 1)\frac{dC^\tau}{d\alpha^\tau} &= -(W_t + a_2\alpha^\tau V'p_t)\frac{dt^\tau}{d\alpha^\tau} - a_2V(p(t^\tau) - p(t^*)) + (1 - \beta)a_2V^\tau \\
&= -(W_t + a_2\alpha^\tau V'p_t)\frac{dt^\tau}{d\alpha^\tau} - \beta a_2V(p(t^\tau) - p(t^*)). \tag{22}
\end{aligned}$$

Substituting (22) into (21), it is found that $dG^\tau/d\alpha^\tau = (1 - \beta)a_2V(p(t^\tau) - p(t^*)) < 0$ and

$$\frac{d^2G^\tau}{d\alpha^{\tau 2}} = (1 - \beta)a_2V'p_t\frac{dt^\tau}{d\alpha^\tau} > 0.$$

Therefore G^τ is decreasing and convex in α^τ.

Similarly for the VER regime, it can be shown that G^v is decreasing and convex in α^v. These properties will be used later to draw $G(\alpha^\tau)$ and $G(\alpha^v)$ curves.

Proof of Lemma 1: Assume that there exists a pair $\{\tilde{x}, \tilde{t}\}$ which maximizes W and that $W(\tilde{x}, \tilde{t}) > W(x(t^*), t^*)$. Also, since a non-binding VER is essentially a tariff, we shall have $\tilde{x} < x(\tilde{t})$, where $x(\tilde{t})$ is obtained from (4) and (5).

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Suppose that $\tilde{t} < t^*$. Notice that since $\tilde{x} < x(\tilde{t})$, a marginal increase in $\tilde{t}$ will increase tariff revenue and W. This then contradicts what we initially assumed.

Now suppose that $\tilde{t} \geq t^*$. Since $\tilde{x} < x(\tilde{t}) \leq x(t^*)$, we will show that a marginal increase in $\tilde{x}$ would increase W, which again contradicts what we assumed. Notice that the first-order condition at t^* is

$$(\underbrace{\frac{\partial W}{\partial x} + \frac{\partial W}{\partial y}\frac{dy}{dx}}_{+})\underbrace{\frac{dx}{dt}}_{-} + \underbrace{\frac{\partial W}{\partial t}}_{+} = 0. \tag{23}$$

Since (23) is for maximization, an increase in x will raise W when $x < x(t^*)$ (i.e., $t > t^*$).

Finally, when $t = t^*$ and $x = x(t^*)$, the constraint $\pi^*(t, x) \geq \pi^*(t^\tau)$ is automatically satisfied and this completes our proof.

Proof of Lemma 2: Using (20), we can show

$$
\begin{aligned}
G^\tau &= W(t^\tau) + a_2\alpha^\tau V(p(t^\tau) - p(t^*))) + (a_1 - 1)C^\tau \\
&= (1 - \beta)[J(t^\tau) - J(t^*)] + W(t^*).
\end{aligned}
$$

Similarly, in the VER regime we have

$$
\begin{aligned}
G^v &= W(x^v) + a_2\alpha^v V(p(x^v) - p(t^*))) + (a_1 - 1)C^v \\
&= (1 - \beta)[J(x^v) - J(t^*)] + W(t^*).
\end{aligned}
$$

Therefore,

$$G^v - G^\tau = (1 - \beta)[J(x^v) - J(t^\tau)]. \; Q.E.D.$$

Proof of Proposition 3: According to the game in this model, it starts with a tariff regime as the status quo. This means that $G^v(\alpha^v = \alpha_o^v) < G^\tau(\alpha^\tau = \alpha_o^\tau)$. Therefore, we

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have $a_1 < H$, where

$$H \equiv 1 + \frac{W^\tau(\alpha^\tau = \alpha_o^v) - W^v(\alpha^v = \alpha_o^v)}{\pi^v(\alpha^v = \alpha_o^v) - \pi^\tau(\alpha^\tau = \alpha_o^v)} + a_2 \alpha_o^v \frac{V^\tau(\alpha^\tau = \alpha_o^v) - V^v(\alpha^v = \alpha_o^v)}{\pi^v(\alpha^v = \alpha_o^v) - \pi^\tau(\alpha^\tau = \alpha_o^v)}.$$

When a_1 is small such that $G^v(\alpha^v = \alpha_o^v) < G^\tau(\alpha^\tau = 1)$, there will be no substitution.

Therefore, for the two curves in Figure 4, we also need $a_1 > L$, where

$$L \equiv 1 + \frac{W^\tau(\alpha^\tau = 1) - W^v(\alpha^v = \alpha_o^v)}{\pi^v(\alpha^v = \alpha_o^v) - \pi^\tau(\alpha^\tau = 1)} + a_2 \frac{V^\tau(\alpha^\tau = 1) - \alpha_o^v V^v(\alpha^v = \alpha_o^v)}{\pi^v(\alpha^v = \alpha_o^v) - \pi^\tau(\alpha^\tau = 1)}.$$

Thus Proposition 3 can be proven as follows.

Part (i): If $\alpha^v > \tilde{\alpha}^v$, political support under the VER regime is always lower than under the tariff regime for any level of α^τ.

Part (ii): Given $\alpha^v = \alpha_o^v$ and that $\tilde{\alpha}^\tau$ is defined such that $G^\tau(\alpha^\tau = \tilde{\alpha}^\tau) = G^v(\alpha^o)$, it is easy to show that:

(a) $G^\tau(\alpha^\tau) > G^v(\alpha_o^v)$, if $\alpha^\tau < \tilde{\alpha}^\tau$;

(b) $G^\tau(\alpha^\tau) < G^v(\alpha_o^v)$, if $\alpha^\tau > \tilde{\alpha}^\tau$.   Q.E.D.

Proof of Proposition 4: From (13), we can show

$$\frac{d(G^\tau(.) - G^v(.))}{da_1} = (1 - \beta)[\pi(t^\tau) - \pi(x^v)] < 0.$$

A rise in a_1 shifts the G^v-curve up relatively more than the G^τ-curve, which makes the VER regime relatively attractive to the government. As in Figure 4, for example, with $G^v(\alpha_o^v) < G^\tau(\alpha_A^\tau)$ initially, a rise in a_1 could move Point V on the G^v-curve above Point A on the G^τ-curve, in that it would now be the case that $G^v(\alpha_o^v) > G^\tau(\alpha_A^\tau)$. Similarly, a fall in a_1 shifts the G^v-curve down relative more than the G^τ-curve, which makes the tariff regime relatively attractive. Q.E.D.

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Endnotes

[1]According to Laird and Yeats (1990), for example, among developed countries the NTBs that affect all four-digit SITC products increased 37 percent between 1966 and 1986. Anderson and Schmitt (1999) illustrate that both the numbers of investigations and positive decisions involving world anti-dumping proceedings tripled during the period of 1970-78 and 1980-86.

[2]Copeland (1990) and Anderson and Schmitt (1999) are exceptions.

[3]The Nash bargaining approach has often been used in the industrial organization literature. As well, Shleifer and Vishny (1994) use this approach in a study on privatization in Russia; Maggi and Rodriguez-Clare (1998) use this approach in a dynamic model of a government's commitment to trade agreements.

[4]Magee, Brock and Young (1989) is an exception but the setup of their framework is very

general.

[5]Industries often try to get support for protection from the public by emphasizing that it is in the national interest. Moreover, if income re-distribution is allowed, the optimal tariff might be the best policy even from consumers' point of view.

[6]This is an advantage of using intersection sets rather than simple parameters for α^τ and α^v.

[7]Although this is essentially a partial equilibrium model, as Brander and Spencer (1984) show, we can always give a general equilibrium interpretation to this model. The issue here, as they point out, is not whether the model is one of partial or general equilibrium, but whether the industry in question is large enough to give rise to income effects, cross-substitution effects in demand, and factor price effects.

[8]The solution for the equilibrium political contribution, C^τ, is provided in the appendix.

[9]Notice that the level of import protection is reflected in the restriction on foreign output rather than the reduced tariff rate t^v, which is the reason for naming this combination a VER.

[10]I thank a referee for suggesting this interpretation.

[11]The word is also sometimes used to describe the uncertainty of a trade barrier itself associated with rules of application and market, which has a very different meaning from ours.

[12]A limitation of the reduced-form political support function is that the value of a_1 has to be restricted. See the appendix for details.

[13]In a finite repeated game, Qiu (1995) shows that a domestic firm prefers negotiating with the foreign firm for a VER to filing a countervailing duty petition.

[14]As documented by Lloyd (1999), for example, Australian governments had unilaterally undertaken a series of tariff reductions. Moreover, over the last fifteen years or so, around one hundred developing countries have initiated unilateral liberalization of one form or another - see Greenaway, Morgan and Wright (1998).

[15]Notice that (19) is the same as the first-order condition for the problem:

$$\max_t \{ J(t) = W(t) + a_2 \alpha^\tau V(p(t) - p(t^*)) + (a_1 - 1)\pi(t) \}.$$
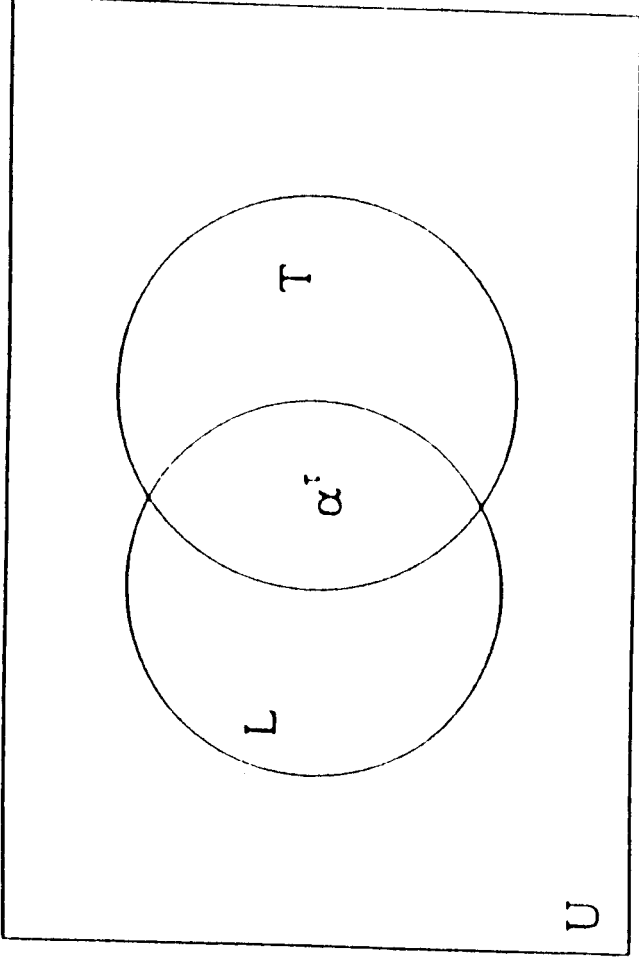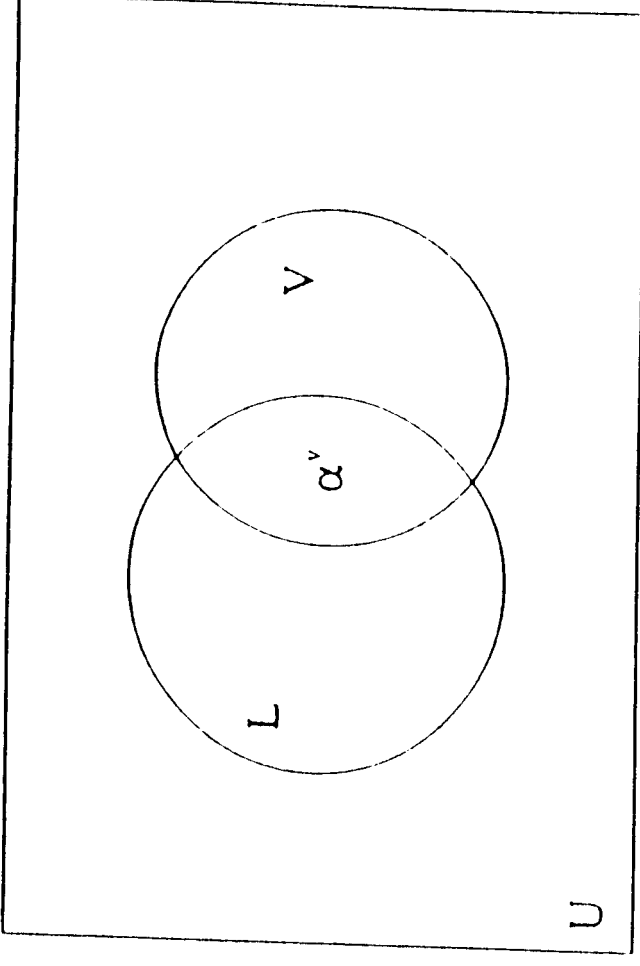
(a) Tariff regime   (b) VER regime
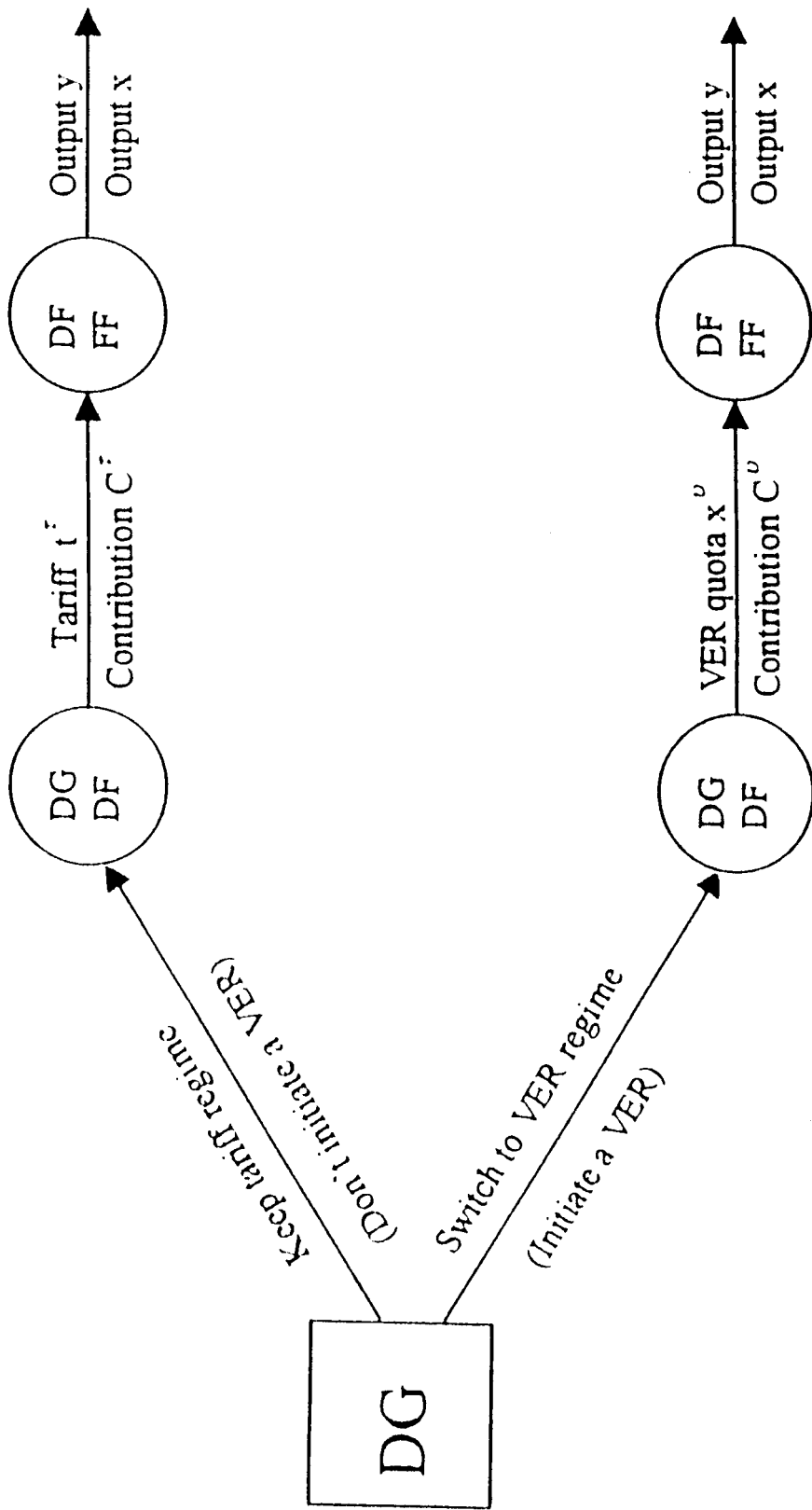
Figure 1: Consumer composition
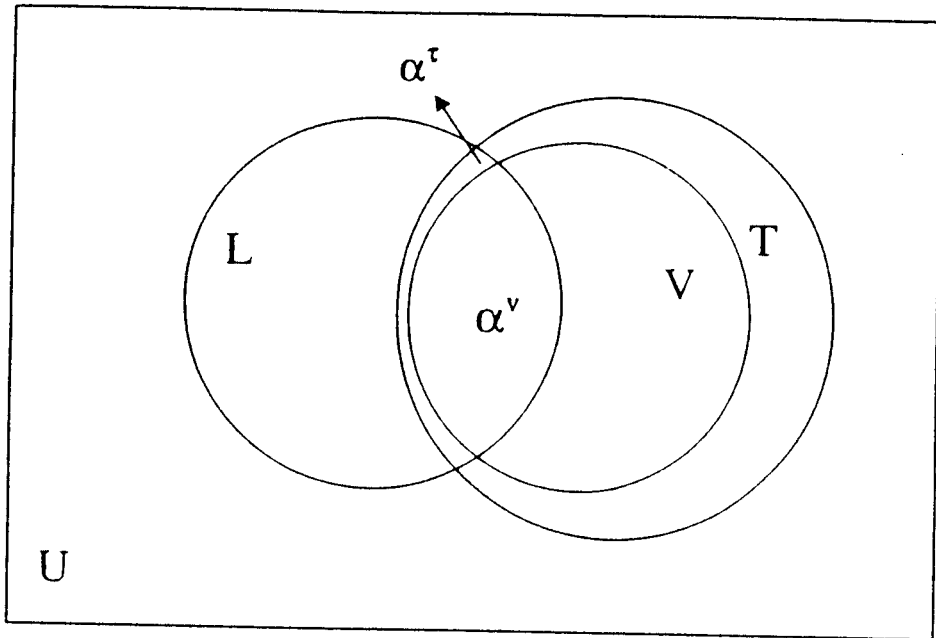
Figure 2: The three-stage game

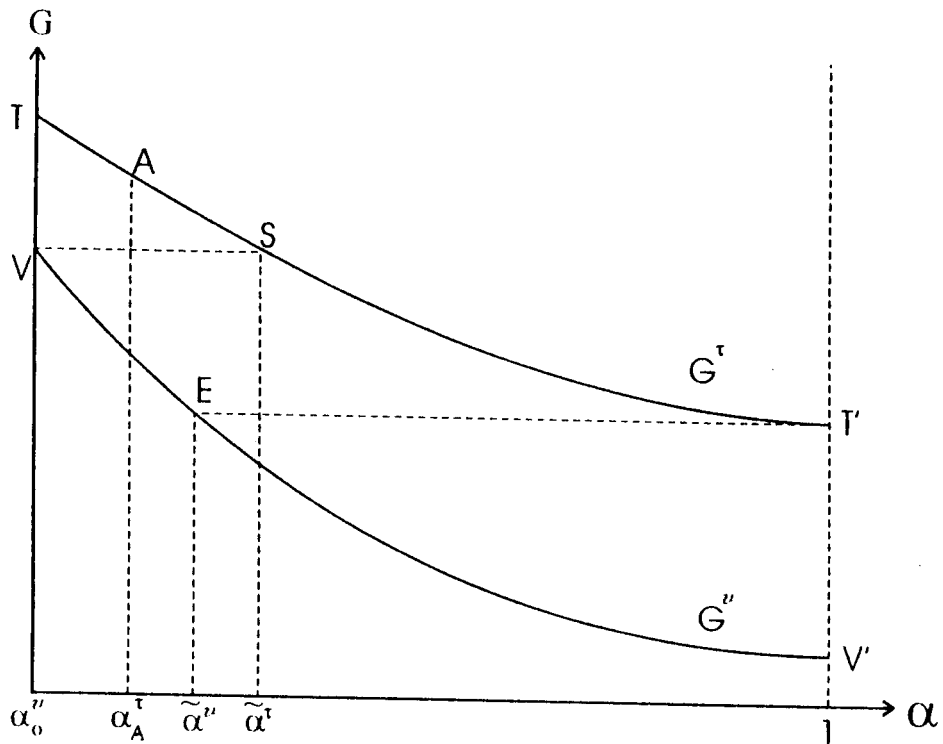Figure 3: Relative transparency of a tariff and a VER regime

Figure 4: Relative transparency, choice of protection and substitution

government's equilibrium choice of trade protection variou