The safeguard clause, asymmetric information, and endogenous protection.

Philippe Kohler[¤] and Michael O. Moore[✧, ✦]
Revised March 1999.

ABSTRACT:

When imports surge, governments often face a conflict among political objectives. They seek simultaneously to satisfy protectionist pressures through increased tariffs, induce adjustment to foreign competition, and minimize consumer costs of protection. The WTO's safeguard clause can be viewed as a way to resolve this political objectives conflict since it allows governments to offer an implicit contract to protected industries in order to induce them to adjust. In this paper, we show that with asymmetric information about costs, protected industries behave strategically which leads to underadjustment. The safeguard clause therefore cannot optimally resolve the conflict among domestic political objectives.

Keywords: adjustment policy, asymmetric information, objectives conflicts, protectionism, safeguard clause.
JEL Classification: F13, L51

[¤] Department of Economics - University of Montpellier - France - E-mail: phkol@sc.univ-montp1.fr.
[✧] Department of Economics / The Elliott School - George Washington University - Washington DC 20052 - USA - E-mail: mom@gwu.edu. (Corresponding author).
[✦] We would like to thank an anonymous referee for very useful comments on an earlier draft. Any remaining errors are our own.

1. Introduction.

Whenever a country's pattern of comparative advantages shifts, some industries incur losses. Economists have long argued that it is nonetheless generally optimal to let the market play its role of resource allocation since free trade usually creates more aggregate gains than losses even if domestic firms are forced either to lower costs to remain economically viable or leave the market

While free trade’s superiority is widely accepted by economists, selective protection measures remain among the most cherished tools used by governments to reach their political objectives. Policy-makers often recognize open trade’s consumer benefits but feel they cannot ignore the competitive pressures placed upon domestic import-competing industries. Governments therefore have justified protection by claiming that domestic industries can regain international competitiveness if temporarily protected from foreign competition. One of the prime means by which this temporary protection may take place is the so-called “safeguard clause.”

In this paper, we analyze the safeguard clause and argue that this protectionist outcome arises out of a government’s attempt to resolve a conflict among domestic political objectives. On one hand, the government seeks to protect pressure groups. On the other hand, it wants to promote overall welfare. These two objectives are often in conflict, especially in trade policy. The safeguard clause gives a government the means to try to resolve this conflict. The safeguard’s clause use also shows the hierarchy that influences trade policy choices --- although satisfying political pressures from import-competing industries is paramount, the effects of protection on domestic economic efficiency and consumers is not ignored. We show that the resolution of the objectives conflict through the safeguard mechanism is undercut with asymmetric information about costs and adjustment effort since it results in under-adjustment of high-cost industries and thus makes the safeguard clause inefficient.

The institutional justification for the safeguard clause can be found in Article XIX of the GATT.[1] Under this arrangement, re-established in the WTO system, a country may raise tariffs for a period of up to four years to remedy or prevent serious injury. Under the new WTO Safeguard Agreement, such a measure may be extended only if "there is evidence that the industry is adjusting."[2] Thus, the WTO signatories have recognized that adjustment to foreign competition is particularly important to the functioning of the safeguard mechanism.

Political reality and experience however show us that protected industries seek generally to maintain their "temporary" protection. While lower costs increase efficiency and hence profits, they also raise the chances that protection will be subsequently lowered. This raises the so-called "ratchet effect" problem of trade protection --- becoming more profitable today jeopardizes future protection. This problem is further exacerbated because it may be difficult for governments to monitor accurately how much effort has been expended in adjusting to international competition.

Researchers have also pointed out that governments have mixed incentives when facing a domestic industry asking for protection. A government whose objective function includes redistributionist goals along with concerns about economic efficiency will encounter problems in optimal implementation of a tariff policy. Staiger and Tabellini (1987) for example study the trade policy choice of a government that cares about income redistribution among workers and faces an import surge in an import-competing sector. Staiger and Tabellini point out that the government's concern about income redistribution makes a free trade commitment not credible. Traditional trade theory predicts that if the government commits to a free trade regime, workers leave the import competing sector if the wage falls sufficiently. However, if workers in the import competing sector fully anticipate a future tariff (aimed to improve the income redistribution by raising the wage in this sector), a free trade commitment in the face of falling import prices is not credible given the income redistribution concerns of policy makers. Staiger and Tabellini thereby raised a time-consistency conflict for policy-makers arising out of competing political concerns: economic benefits from free trade (along with optimal allocation of labor among sectors) conflict with the political return from protection (arising out of income redistribution through tariffs).

Tornell (1991) examines whether specific protectionist tools can be used to eliminate the Staiger and Tabellini time-inconsistency problem. Investment-contingent subsidies granted after adjustment has taken place but provided before the adjustment process through a bailout mechanism can be tailored to resolve the time-inconsistency problem but would be so costly for the industry that they rarely would be chosen.

Other works have focused on the political motivation for trade protection and its welfare consequences. The political genesis of protection measures has been examined by Hillman (1982) and further developed by Cassing and Hillman (1986), van Long and Vousden (1991), Brainard and Verdier (1994, 1997), and Grossman and Helpman (1994) among others.[3] A frequent point of this literature is that political goals (either maximizing political support or maximizing the chance for reelection) rather than economic concerns may generate motives for protection.

Brainard and Verdier (1997) show the ineffectiveness of adjustment goals in a dynamic framework. Protection comes from the intrinsic inconsistency when policy maker's decisions are politically biased. The domestic industry uses resources to lobby instead of using these resources to finance its adjustment activities. Because current adjustment is not undertaken, future potential protection brings higher gains to the import-competing industry and thus becomes more profitable compared with future adjustment. Once initial protection has been triggered, under-adjustment may persist until the industry finally collapses as is as been shown in the static framework of Cassing and Hillman (1986).

This under-adjustment problem is especially relevant with the safeguard clause since it is explicitly designed to help industries respond to increased import competition.[4] In the safeguard institutional framework, the government which implements the protection faces a dilemma --- the government must simultaneously provide protection from foreign imports and induce the industry to adopt an optimal level of adjustment. As Jackson (1993, pp. 185-186) points out:

> "[I]f adjustment truly is the rationale for temporary safeguard actions to limit imports, then it follows that it might be appropriate for the government to demand an effective adjustment program from the industry concerned, and/or to tailor government policies (including direct or tax aids) to encourage and assist such adjustment."

Thus, a safeguard policy should be based on a contractual relationship: the domestic industry that benefits from trade protection has obligations to adjustment.

In this paper, we analyze a safeguard mechanism with costly adjustment when trade policy decisions are motivated by both economic *and* political effects. We build on Staiger and Tabellini's work and assume that the government knows that it faces strategic behavior by the import-competing industry. We also follow the spirit of Grossman and Helpman (1994), among others, by allowing the government to maximize a weighted average of domestic consumer and producer groups. In our framework, if the industry knows that the government uses protection to achieve political objectives, it will try to manipulate the protection process in order to get more protection than optimal from the government's point of view.

With complete information, the industry cannot behave strategically. The government sets the safeguard tariff such that the industry's protection-generated profit just equals its adjustment cost while the optimal level of adjustment effort is such that the marginal increase of the adjustment cost equals the marginal increase of profit. This outcome achieves the highest possible consumer surplus consistent with a newly-competitive domestic industry. The complete information benchmark allows the government to compute the weight assigned to the pressure group in the asymmetric information context. The weight is the political shadow price associated with the constraint of non-negative domestic industry profits in the complete information context.

If the firm has an unobservable cost structure and adjustment effort, the government is able only to observe the realization of the domestic industry's post-protection profits.[5] The industry will use the parameters of the government protection decision to maximize its protection rent. If the industry has low costs, then it has an incentive to misreport its cost structure to obtain a higher tariff because it knows that a high-cost industry needs the high protection to finance its adjustment effort. In this context, the protected industry acts strategically as a Stackelberg leader vis-à-vis the government.

Because such strategic behavior lowers government welfare through the burden placed on consumers, the government must try to reverse the roles in that game by using an incentive-compatible safeguard mechanism. This protection scheme is implemented by using a government-proposed implicit contract that stipulates that protection is maintained if the protected industries become profitable. However, the safeguard tariff fails to fully resolve the conflicts between consumer and producer interests since sub-optimal adjustment will take place under asymmetric information.[6]

The paper is organized as follows. In Section 2, we introduce the model, analyze a complete information without domestic industry strategic behavior, and compute the weight assigned to the protection rent of the pressure group in the asymmetric information context. In Section 3, we derive the optimal incentive-compatible implicit protection contract proposed by the government to the domestic industry when the latter behaves strategically in the context of asymmetric information. Concluding remarks are contained in Section 4.

2. Evaluating the political objectives conflict with full information.

In this section, we evaluate the political objectives conflict with full information. When setting the level of protection, we assume that the government must consider the impact on two distinct entities: consumers and import-competing firms. The government wants to receive the highest possible political return from protecting an industry harmed by imports but also seeks to minimize the adverse consumer effect generated by protection. These two objectives are antagonistic but there exists a hierarchy between them. In particular, while we assume that the government considers the effect of its trade policy decision on both groups, the government is assumed to operate with the underlying constraint that the industry must have a minimum level of profits.

To achieve its goal, the government ties political protection effects to welfare effects. A simple way to benefit from the political return of protection while minimizing its political cost (given by the adverse consumer effect) is to transfer the responsibility of protection to the import-competing industry. By offering an implicit contract to the protected industry, the government asks it to exert effort to adapt to foreign competition.

Our partial equilibrium framework follows the theory of incentives in regulation and procurement developed by Laffont and Tirole (1993). There are two groups of individuals in the domestic economy. The preferences of the owners of the import-competing firms are represented by U, which equals industry (tariff-distorted) rent. The preferences of domestic consumers are summarized using an aggregate utility function denoted by V. Total domestic utility function denoted by $W = U + V$.

The perfectly-competitive domestic industry produces a homogenous product for the domestic market and is composed of identical firms, each of which has a sunk cost and increasing marginal cost. We assume that the sunk cost is sufficiently high to prevent the entry of new domestic firms even in the presence of positive economic profits. The economy is small in international markets so that foreign supply is assumed to be infinitely elastic at the world price. We also assume that at this price the domestic industry has negative profits and thus suffers from ”serious” injury, i.e., it fulfills the requirements for protection under the WTO safeguard system.

Without any government intervention, the domestic industry will consider whether costly adjustment to the foreign competition is in its economic interests. For some range of domestic cost structures, costly adjustment under free-trade will makes sense; otherwise, the industry will shut down, thereby transferring resources to other uses and also saving any potential adjustment efforts.

However, in this model, we assume that political considerations preclude the government from allowing the domestic industry to receive negative profits. Thus, the government must implicitly determine a new domestic price by imposing a tariff through the safeguard clause.[7]

We let $Q(P)$ denote the total demand on the domestic market. The domestic (tariff-inclusive) price is P. The domestic industry supply is given by $q_h(P)$ while $q_f(P)$ represents the domestic excess demand for imports. The domestic market clearing condition requires that $Q(P) = q_h(P) + q_f(P)$.

The domestic industry's post-protection profit $p\left(q_h, e - q\right)$ is a function of the domestic industry cost type q, the domestic supply $q_h(P)$, and the level of adjustment effort e. The adjustment cost $K(e)$ is an increasing and convex function of the adjustment effort e. For simplicity, we assume that $p\left(q_h, e - q\right)$ and the adjustment cost $K(e)$ are separable.

Domestic industry rent U arising from the safeguard policy is defined as the difference between its tariff-distorted profit and the adjustment cost incurred during the protection period to lower its production costs:

$$U = p\left(q_h, e - q\right) - K(e) \tag{1}$$

The value of $p\left(q_h, e - q\right)$ equals post-adjustment quantity supplied multiplied by the difference between the marginal cost (equal to domestic price for these perfect competitors) and the average total cost:

$$p\left(q_h, e - q\right) = \left[MC\left(q_h, e - q\right) - AC\left(q_h, e - q\right)\right] \cdot q_h \tag{2}$$

We make the following assumptions about the nature of the profit function:

$$p_{q_h} > 0, p_{q_h q_h} > 0, p_e > 0, p_{ee} < 0,\ p_q < 0, p_{qq} \geq 0, p_{eq_h} > 0 \tag{3}$$

Thus, the domestic industry profit is an increasing and convex function of its supply $q_h(P)$, an increasing and concave function of its adjustment effort *e*, and a decreasing and convex function of its cost parameter q . In addition, higher effort increases marginal profit.

The consumers' utility function is given by the sum of consumer surplus and the redistributed tariff revenue, where P_w is the international price:

$$V = \int_P^{\infty} Q(z) \cdot dz + \left(P - P_w\right) \cdot q_f(P) \tag{4}$$

The government maximizes total domestic utility W which includes both consumer and firm welfare. However, the government also operates under a political constraint. Similar to Staiger and Tabellini (1987), the government selects policies so that profits are non-negative after protection. Once implemented, protection remains in order to keep unchanged the subsequent import competing industry owners' rent. In this case, the industry will exert an adjustment effort if it is compensated by a positive profit resulting from the safeguard protection. Thus, W is maximized subject to:

$$p\left(q_h, e-q\right) - K(e) \geq B(q) \tag{5}$$

where $B(q)$ is a given value assigned to the protection rent by the government.

Because adjustment effort is financed by import protection and that effort is observed by the policy-maker during the adjustment period, the industry is better off adopting the required level of effort when the government commits not to expropriate the rent of the firm after effort has taken place.

If the government does not make this commitment, the adjustment program is not individually rational. The industry will only participate in the program if it is better off after its adjustment since it knows that the government may gain politically in the adjustment process. In other words, the game must be positive-sum --- the government gains politically by inducing the industry to adjust but must share that gain in order to obtain its cooperation.

In order to maximize the welfare function *W*, the government will finance the industry's optimal adjustment effort *e** by raising the market price *P(q)* with a tariff *t(q)*, both of which are functions of the domestic firm's costs. With no hidden action or information of the industry, the government observes the world price P_w, the domestic industry cost type *q*, the profit $p\left(q_h, e-q\right)$, and the adjustment cost $K(e)$.

The government political choice emerges from the solution of the program (*P1*):

$$(P1) \quad \begin{cases} \underset{e,P}{Max} W = \int_P^\infty Q(z)\cdot dz + p\left(q_h, e-q\right) - K(e) + \left(P - P_w\right)\cdot q_f(P) \\ s.t.\, p\left(q_h, e-q\right) - K(e) \geq B(q) \end{cases} \tag{6}$$

The Lagrangian *L* associated with *(P1)* is:

$$\underset{e,P,\lambda}{Max}\ L = \underset{e,P,\lambda}{Max}\left\{\int_P^{\infty} Q(z)\cdot dz + \left(P - P_w\right)\cdot q_f\left(P\right) + \left(1+\lambda\right)\cdot\left[\pi\left(q_h, e-\theta\right) - K(e)\right] - \lambda\cdot B(\theta)\right\} \tag{7}$$

where λ is the Lagrangian multiplier for the non-negative profit constraint

The government's problem can be seen as maximizing a weighted average of domestic interests. In particular, if the constraint is binding (i.e., firms make negative profits at world prices), then λ is positive and the domestic industry profit receives a higher weight than domestic consumers.

The solution to *(P1)* results in the implicit contract in the complete information case (given by the values of P^*, e^*, t^{CI}) and must satisfy the following (See Appendix 1 for details.):

$$\pi\left(q_h(P^*), e^* - \theta\right) = K(e^*) \tag{8}$$

$$\pi_e\left(q_h(P^*), e^* - \theta\right) = K_e(e^*) \tag{9}$$

$$t^{CI} = P^* - P_w = -\lambda\cdot\frac{q_h}{\frac{\partial q_f}{\partial P}} \tag{10}$$

These solutions have easy interpretations.

Expression (8) means that the price on the domestic market has to be raised so that the rent of the protected industry equals zero. This results in the lowest possible price on consumers consistent with non-negative industry profit, i.e., $B(\theta) = 0$. Expression (9) means that adjustment is chosen optimally from the industry's view --- the marginal effect of adjustment effort on profit must equal its marginal cost.

Expression (10) is the complete information tariff. It will depend on the price effect on domestic excess demand and λ, the political shadow cost of the non-negative profit constraint. Expression (10) can be rearranged to show how λ, the political shadow cost of protection reflects the increase of overall welfare if the tariff was lowered. It allows us to evaluate the acuteness of the political objectives conflict between consumers and producers, as measured by the weight that the government gives to the domestic industry when setting its trade policy:

$$l = \left[\frac{-(P_w - P^*)}{P^*}\right] \cdot \frac{h}{b} = \left[\frac{-(P_w - P^*)}{P^*}\right] \cdot \frac{e}{x} \tag{10'}$$

where $$b = \frac{q_h}{q_f}, x = -\frac{\P q_h}{\P q_f}, h = -\frac{P \cdot \frac{\P q_f}{\P P}}{q_f}, e = \frac{P \cdot \frac{\P q_h}{\P P}}{q_h} \tag{11}$$

Expression (10') shows that l, the political shadow cost of protection can be broken into two distinct effects: a price effect and an elasticity and market share effect.

First, both versions of (10') contain $-(P_w - P^*)/P^*$ which is simply the percentage drop in the domestic price if the tariffs were removed. In other words, it is the direct opportunity cost of the price distortion. The lower (higher) is the world (tariff-distorted) price, the higher shadow price of protection.

The second set of elements involves price elasticities and market share effects. The first version shows that the more elastic import demand h is, the higher will be the political shadow price. Conversely, the lower the domestic market share q_h / q_f, the larger l will be. The second version shows that domestic response to price changes and foreign supply changes are also important. In particular, a high value for domestic price elasticity e translates into a high value for l as does a large increase in domestic supply as imports fall.

As shown above, as long as the government can observe q and the function $p\left(q_h, e - q\right)$, it can infer effort e. Therefore, in order to minimize the economic cost of the protection, the government can impose a "minimum profit value target" for the domestic industry, $p\left(q_h, e^* - q\right)$. If the industry does not exert the optimal level of adjustment effort, it has not respected the implicit contract. The government has to penalize it at the end of the protection period, once the political return has been earned, by lowering the tariff below its post-protection commitment value. However, the ability to monitor perfectly means that the government never penalizes because its threat is credible.

3. Using the safeguard clause under asymmetric information.

When the government is unable to observe domestic production costs, it cannot disentangle the effects of high domestic production costs and low adjustment effort. Low realized profits could be the result of a high-cost industry which had exerted optimal adjustment effort or it could be a consequence of a low-cost industry under-adjusting. Thus, the domestic industry has an incentive to manipulate the protection scheme since it knows that the government seeks to maximize its political return. The industry may do so by announcing that it is a high-cost industry in order to obtain a protection level excessive for its true costs. These facts highlight the principal-agent relationship between the government and the domestic industry which can be viewed as a Stackelberg game where the industry is the leader and the government is the follower.

The purpose of the optimal political choice under strategic behavior consists of reversing the roles in the game. By proposing a *politically-optimal incentive-compatible mechanism* to the domestic industry, the government resolves both unobservable effort and adverse selection problems arising out of the desire to implement the complete information policy in a world of incomplete information.

The information asymmetries mean that the government cannot check the true level of profits. Therefore when the injured industry asks for protection, the government proposes an implicit contract to the domestic industry. The contract specifies the politically optimal market price (and accordingly the safeguard tariff) and the level of profit that the domestic industry commits to earn in exchange for the protection.

At the beginning of the protection episode, the profit is subject to uncertainty so the protection cannot be directly based on $p(.)$. Instead, the government observes a noisy realized level of profit but does not know the true value of q and cannot monitor the level of adjustment effort, *e*. In other words, the government bases protection on an observable and verifiable *ex-post* monitor *x* subject to the conditional probability distribution $F(x|p)$ with density *f(.)*.

The government's expectations about q are summarized by a prior cumulative distribution $G(q)$ with differentiable density *g(q)*, such that *g(q) > 0* for all q belonging to the set $\Theta = \left[q^{-}, q^{+}\right]$ and such that *G/g* has the monotone hazard-rate property, i.e., is non-decreasing in *q*. The distribution function *G* is common knowledge to all players. In order to induce the domestic industry to choose the tariff designed for it and to exert the optimal level of effort, the authority proposes the contract $\{p(q), P(q)\}$ that links the type q industry's choice of the domestic market price $P(q)$ to the profit $p(q)$.

3.1 Constraints on the government problem with asymmetric information.

<u>3.1.a Politically incentive-compatibility (PIC) constraint.</u>

The protection rent B of the domestic industry of type q when it reports $\tilde{q}$ is:

$$B(\tilde{q}, q) = \int_x x(\tilde{q}, q_h) \cdot f(x|p) \cdot dx - K(e(q)) \tag{12}$$

By applying the Revelation Principle[8], the government can restrict its political choice to incentive-compatible mechanisms, i.e., mechanisms for which the industry reports its type truthfully. In this framework, the type q industry will choose a response $\tilde{q}(q) = q$ if its protection rent *B(q,q)* is at least as high as its rent from lying $B(\tilde{q},q)$.

Formally, the mechanism is *politically incentive-compatible (PIC)* if:

$$B(q,q) \geq B(\tilde{q},q) \quad \forall(\tilde{q},q) \in [q^-,q^+] \times [q^-,q^+] \quad (PIC) \tag{13}$$

Using the well-known and useful trick of Mirrlees (1971), *PIC* can be rewritten as follows:

$$B(q) = \max_{\tilde{q}} \left[\int_x x(\tilde{q},q_h) \cdot f(x|p) \cdot dx - K(e(q)) \right] \tag{14}$$

Expression (14) can be used along with Leibniz's rule and the envelope theorem to obtain:

$$\frac{dB(q)}{dq} = \int_x x(\tilde{q},q_h) \cdot f_p(x|p) \cdot p_q \cdot dx = p_q \cdot \int_x x(\tilde{q},q_h) \cdot f_p(x|p) \cdot dx \tag{15}$$

The optimal adjustment level *e(q)* for the industry is given by:

$$e(q) \in \arg\max_e B(q) \tag{16}$$

Restricting ourselves to the first-order-condition approach (see Rogerson, 1985) for a solution to (16) yields:

$$\frac{dB(q)}{d\,e} = \int_x x(\tilde{q},q_h) \cdot f_p(x|p) \cdot p_e \cdot dx - K_e(e(q)) = 0 \tag{17}$$

By rearranging expression (17), we get a more tractable expression:

$$\frac{K_e(e)}{p_e} = \int_x x(\tilde{q},q_h) \cdot f_p(x|p) \cdot dx \tag{17'}$$

Substituting (17') into (15) yields:

$$\frac{dB(q)}{d\,q} = K_e \cdot \frac{p_q}{p_e} \leq 0 \tag{18}$$

Expression (18) thus incorporates both an incentive-compatibility constraint and the condition that adjustment effort is chosen by the industry to maximize its own protection rent. The inequality of (18) means that *PIC* protection rent arising from the safeguard policy must be a decreasing function of the industry's cost type. This arises because profit net of adjustment costs is a positive and negative function of effort and cost type, respectively ($p_e > 0$ and $p_q < 0$), and adjustment costs rise with effort $K_e > 0$.

If this first-order condition is satisfied and if *p(q)* is non-increasing in *q*, then these conditions are sufficient for the global politically incentive- compatibility of the government political choice mechanism. (See Appendix 2 for *PIC* second- order condition treatment).

3.1.b. Non-negative profits for all industry cost types.

When setting the safeguard policy, the domestic government has to consider its political objective, i.e., the political return maximization problem which requires that the domestic industry's protection rent must be non-negative whatever its cost type. We denote this constraint by *(PR)* which is an individual rationality constraint --- unless firms achieve at least a share of the surplus accorded to the government through the politically-optimal protection program, it will not participate in the plan.

Formally, we have:

$$B(q) \geq 0 \ \forall q \in \Theta \ (PR) \tag{19}$$

Integrating the *PIC* constraint, we get:

$$B(q) = -\int_{q}^{q^+} \frac{dK(e(n))}{de} \cdot \frac{p_q}{p_e} \cdot dn + B(q^+) \tag{20}$$

Since we know from (18) that $B(q)$ is a decreasing function of the industry cost type for any *PIC* mechanism, *(PR)* can be replaced by:

$$B(q^+) = 0, \ B(q) \geq 0 \ \forall q \neq q^+ \tag{21}$$

that is, only the highest cost firm will receive no rent from protection. The informational rent arising out of the incomplete information is thus:

$$B(q) = -\int_{q}^{q+} \frac{dK(e(n))}{d\,e} \cdot \frac{p_q}{p_e} \cdot dn \qquad (20')$$

3.2 The government's problem under asymmetric information.

The privately-held information will affect the industry's protection rent *B* and therefore change the government choice of a tariff. The government potentially can use the provision of the rent to induce the industry to act in a way which minimizes the political costs of increased prices to consumers.

Under asymmetric information, the government knows that the domestic industry will behave strategically. Thus, the government also will take the *PIC* and the *PR* constraints into account when maximizing the expected value of the weighted-average national welfare function (W^{AI}).

Formally:

$$(P2) \quad \begin{cases} \underset{P(.),e(.)}{Max} \int_{q-}^{q+} W^{AI} \cdot g(q) \cdot dq & \\ st: \ \frac{dB(q)}{dq} = \frac{dK(e)}{d\,e} \cdot \frac{p_q}{p_e} & (PIC) \\ B(q^{+}) = 0 & (PR) \end{cases} \qquad (22)$$

where W^{AI} is the Lagrangian function from the complete information problem. That is:

$$W^{AI} = V + (1 + l\,) \cdot U - l\ B(q) \qquad (23)$$

Expression (23) makes clear the domestic conflicts facing the government. For positive values of l, the producers receive a higher weight than consumers. At the same time, the information asymmetries mean that *B(q)* will be greater than zero for all but the least efficient industry types. But the government must be willing to offer some positive rent to induce "good" adjustment behavior which will reduce the value of the government's objective function.

The government, having a prior belief about the domestic industry cost type *q* summarized by the density *g(q)*, seeks to implement its political choice subject to the political incentive-compatibility and the political return constraint. We adopt a control-theoretic approach to solve the government's problem.[9] In this approach, the industry's protection rent *B(q)* is the state variable and the controls are *P, e* and *dB(q)/dq)*.

Expression (20') and the first-order conditions yield (see Appendix 3 for details):

$$p\left(q_h(P), e - q\right) - K\left(e(q)\right) = -\int_{q}^{q^+} K\left(e(n)\right)_e \cdot \frac{p_q}{p_e} \cdot dn \qquad (24)$$

$$(1+l)\cdot\left(p_e - K_e\right)\cdot g(q) = l \cdot G(q)\cdot\left[-\frac{¶}{¶e}\left(\frac{p_q}{p_e}\right)\cdot K_e - \left(\frac{p_q}{p_e}\right)\cdot K_{ee}\right] \qquad (25)$$

$$\frac{t(q)}{P^*} = \frac{P^* - P_w}{P^*} = l \cdot \left(\frac{b}{h} + \frac{1}{P}\cdot K_e \cdot \frac{¶}{¶q_f}\left[-\frac{p_q}{p_e}\right]\cdot\frac{G(q)}{g(q)}\right) \qquad (26)$$

These results show three types of distortions due to the strategic behavior of pressure groups.

Expression (24) demonstrates the political return distortion. The government must increase the protection rent *B* of all industries with less than maximum costs ($q < q^+$) if it wants the political return constraint *(PR)* not to be violated. This means that ensuring a non-negative protection rent to the highest-cost firm will allow other firms to obtain informational rents in addition to protection rents. The informational rent is at its maximum for the lowest-cost industry ($q = q^-$) and equals zero for the highest-cost industry ($q = q^+$).

Expression (25) shows an effort distortion. The term on the LHS of (24) is the expected marginal political return of the adjustment program, i.e., the increase in domestic profit due to effort, evaluated at the industry weight in the government's problem $(1+l)$. The RHS is the expected increased cost of the informational rent as effort rises. (Recall that $m(q)=l\cdot G(q)$ is the co-state variable associated with the state equation *PIC* in the Hamiltonian.) Thus, the government induces the industry to increase its adjustment effort until the expected marginal profit equals the economic cost of the informational rent. This yields an optimal level of effort only for the low cost industry. For that industry, the level of adjustment effort is the same as in the symmetric information setup. For all other industries, the level of adjustment effort is lower than with symmetric information.

The choice of protection under asymmetric information therefore yields lower effort for the high-cost industries. This fact reflects the trade-off faced by the government between assisting the adjustment effort (increasing the political return) and reducing the domestic industries' informational rent (decreasing the economic cost). On one hand, the government is forced to leave rents to the industry to induce it to adopt an optimal adjustment effort. On the other hand, it wants to reduce the benefits that are costly for consumers through high domestic prices.

These results allow us to give the following proposition:

Proposition 1: *Under strategic industry behavior, the political choice of trade protection through the safeguard clause entails a trade-off between maximizing political return and minimizing economic costs. This trade-off effects a sub-optimal level of adjustment effort: less efficient industries under-adjust while only the most efficient adjusts optimally. The safeguard clause therefore is economically irrational.*

The effect of asymmetric information on the level of the tariff compared to complete information is ambiguous and depends on the effects of reduced imports on the profit trade-off between effort and cost type. In particular, expressions (10) and (26) shows that the difference between the complete and incomplete information level of tariffs equals:

$$\frac{1}{P} \cdot \frac{G(q)}{g(q)} \cdot K_e \frac{\partial (-p_q / p_e)}{\partial q_f} \qquad (27)$$

The sign of (26) depends on the value of $\frac{\partial (-p_q / p_e)}{\partial q_f}$, which is how changing domestic excess demand for imports q_f affects the marginal rate of substitution between effort and cost type for a constant level of profits. If $\frac{\partial (-p_q / p_e)}{\partial q_f} > 0$, then for a given level of profits, a lie about costs will result in lower adjustment effort. However, while the tariff will be higher, the informational rent, $B(q) = -\int_{q}^{\bar{q}} \frac{dK(e(n))}{de} \cdot \frac{p_q}{p_e} \cdot dn$, will also be adjusted downward.

This yields the following proposition:

Proposition 2: *If a reduction in imports reduces (increases) the trade-off between effort and cost type, an incomplete information safeguard tariff will be higher (lower) than the complete information tariff. The government consequently adjusts the informational rent downward (upward). Strategic behavior thus reduces (increases) consumer welfare at the cost of sub-optimal adjustment effort of inefficient industries.*

When the domestic industry adopts strategic behavior, the authority does not take into account the real protection rent but considers a "*virtual protection rent*" which includes the informational part of the protection rent. The conjunction of asymmetric information and different industry cost structures results in a negative informational externality --- the presence of high-cost industries causes the low-cost industries to behave strategically. In order to internalize that informational externality generated by the presence of high-cost industries, the authority distorts the symmetric information safeguard policy of high-cost industries and induces them to adopt a sub-optimal level of adjustment effort.

4. Concluding remarks.

In this paper, we have shed some light on government use of the safeguard clause. We have modeled the safeguard clause as a device used by governments to resolve political "objectives conflicts" arising from the tension between maintaining non-negative domestic industry profits and the impact on consumers of higher tariffs. We have done so in a model where the domestic firm incurs costs as it adjusts to foreign competition. The government's policy is politically constrained by a requirement that domestic firms earn non-negative profits.

We found that if the government can monitor effort and costs perfectly, the government can offer a tariff in exchange for an adjustment effort optimal for the domestic industry's specific cost structure. Complete information and the lack of strategic behavior by the domestic industry allows the government to offer only enough protection to insure that the industry will adjust but that simultaneously minimizes consumer costs. These consumer costs will be relatively small when domestic production expands relatively more than the domestic consumption contracts.

We also have studied how a government might try to implement a protection plan when the problem of the objectives conflict is further complicated by asymmetric information. We have assumed that the government is imperfectly informed about the domestic industry's features.

Specifically, the government is able to check the domestic industry's profit level at the end of the protection period but is unable to disentangle the effects of different firm cost types from firm effort to increase efficiency.

We showed that in such an environment, the domestic industry acts strategically so that a (constrained) optimal protection rule must be derived which is incentive-compatible. The resulting incentive mechanism consists of a menu of implicit contracts proposed by the government to the domestic industry when the safeguard policy is requested. The implicit contract which implements the politically-optimal tariff choice (i.e., the choice that resolves the political objectives conflicts among different domestic interests), results in a high-cost industry remaining inefficient. The only industry which would adopt the optimal level of adjustment, ironically, has the lowest-cost.[10]

This research reinforces the argument that the WTO safeguard mechanism has weak foundations in pure economic considerations. The basic contradiction contained in the safeguard code (protecting in order to help adjustment) and our results suggest that free trade would be a more efficient adjustment program. Without government intervention, domestic firms themselves would make the decision whether adjustment or exit would make more sense.

Even though Article XIX of the GATT requires adjustment plans to be part of a safeguard mechanism, the results presented here cast doubt on governments' ability to induce domestic industries to adjust to foreign competition. While politicians might legitimate safeguard mechanisms by appeals to adjustment, such programs likely would be implemented inefficiently.

References:

Baldwin Robert E., "The Political Economy of Trade Policy", *Journal of Economic Perspectives* 3 (1989): 119-35.

Brainard, S. Lael and Thierry Verdier, "Lobbying and Adjustment in Declining Industries"

European Economic Review 38 (1994): 586-95.

Brainard, S. Lael and Thierry Verdier, "The Political Economy of Declining Industries: Senescent Industry Collapse Revisited" *Journal of International Economics*, 42 (1997): 221-37.

Cassing, James H. and Ayre L. Hillman, "Shifting Comparative Advantage and Senescent Industry Collapse" *American Economic Review*, 76 (1986): 516-523.

Dinopoulos, Elias, Tracy Lewis, and David Sappington, "Optimal Industrial Targeting with Unknown Learning-by-doing." *Journal of International Economics*, 38 (1995): 275-95.

Feenstra, Robert C. and Tracy Lewis, "Distributing the Gains from Trade with Incomplete Information," *Economics and Politics*, 3 (1991): 21-39.

Grossman, Gene and Elhanan Helpman, "Protection for Sale," *American Economic Review*; 84 (1994): 833-50.

Hillman, Ayre L., "Declining Industries and Political-support Protectionist Motives" *American Economic Review*, 72 (1982): 1180-87.

Hillman, Ayre L., *The Political Economy of Protection*, Chur, Switzerland:. Harwood Academic Publishers, 1989.

Jackson, John H., "Safeguard and Adjustment Policies," in Robert M. Stern, (ed.), *The Multilateral Trading System: Analysis and Options for Change*, Ann Arbor: University of Michigan Press, 1993.

Laffont, Jean-Jacques and Jean Tirole, *A Theory of Incentives in Procurement and Regulation*, Cambridge, MA: MIT Press, 1993,.

Mirrlees, James, "An exploration in the theory of optimum income taxation", *Review of Economic Studies*, 38 (1971), 175-208.

Moore, Michael O., "New Developments in the Political Economy of Protection," in Colin Carter, Alex McCalla and Jerry Sharples (eds.), *Imperfect Competition and Political Economy*, Boulder, CO: Westview Press, 1990.

Moore, Michael O. and Steven Suranovic, "A Welfare Comparison Between VERs and Tariffs

Under the GATT," *Canadian Journal of Economics*, 26 (1993): 447-56.

Myerson, Roger B., "Incentive Compatibility and the Bargaining Problem", *Econometrica*, 47 (1979): 61-74.

Nelson Douglas, "Endogenous Tariff Theory: A Critical Survey", *American Journal of Political Science*, 32 (1988): 796-837.

Rodrik Dani, , "Political Economy of Trade Policy" in Gene M. Grossman and Kenneth Rogoff (eds.), *Handbook of International Economics, Vol.3,* Amsterdam*:* Elsevier Science Publishers, 1995.

Rogerson, William, "The First Order Approach to Principal-agent Problems", *Econometrica*, 53 (1985): 1357-68.

Staiger Robert W. and Guido Tabellini, "Discretionary Trade Policy and Excessive Protection", *American Economic Review*, 77 (1987): 823-37.

Tornell, Aaron, 1991, "On the Ineffectiveness of Made-to-Measure Protectionist Programs", in Elhanan Helpman and Assaf Razin, (eds.), *International Trade And Trade Policy*, Cambridge, MA: MIT Press.

Uruguay Round Agreement on Safeguards http://www.wto.org/wto/legal/finalact.htm, March 2000.

Van Long, Ngo and Neil Vousden, "Protectionist Response and Declining Industries" *Journal of International Economics*, 30 (1991): 87-103.

Appendix 1: Safeguard tariff with symmetric information:

The domestic government maximizes the sum of consumer surplus, domestic profit net of adjustment costs, and tariff revenue:

$$\begin{cases} \underset{e,P}{Max}\, W = \int_{P}^{\infty} Q(z)\cdot dz + \pi\left(q_h, e-\theta\right) - K(e) + \left(P - P_w\right)\cdot q_f\left(P\right) \\ s.t. \quad \pi\left(q_h, e-\theta\right) - K(e) \geq B(\theta) \quad \left(\lambda\right) \end{cases} \tag{A1a}$$

We can rewrite (A1a) as follows:

$$\underset{e,P,\lambda}{Max}\; L = \underset{e,P,\lambda}{Max}\left\{\int_{P}^{\infty} Q(z)\cdot dz + (1+\lambda)\cdot\left(\pi\left(q_h, e-\theta\right) - K(e)\right) + \left(P - P_w\right)\cdot q_f(P) - \lambda\cdot B(\theta)\right\}$$

Consumer surplus will be highest while maintaining non-negative domestic profits when $B(\theta) = 0$.

First-order conditions yield:

$$\frac{\partial L}{\partial e} = 0 \Leftrightarrow K_e(e^*) = \pi_e\left(q_h(P^*), e^* - \theta\right) \tag{A1b}$$

$$\frac{\partial L}{\partial \lambda} = 0 \Leftrightarrow K(e^*) = \pi^*\left(q_h(P^*), e^* - \theta\right) \tag{A1c}$$

$$\frac{\partial L}{\partial P} = 0 \Leftrightarrow \left(P - P_w\right)\cdot\frac{\partial q_f}{\partial P} = q_h - (1+\lambda)\cdot\frac{\partial \pi\left(q_h, e-\theta\right)}{\partial P} \tag{A1d}$$

Because $\pi\left(q_h, e-\theta\right) = \left[MC\left(q_h, e-\theta\right) - AC\left(q_h, e-\theta\right)\right]\cdot q_h$ we can rewrite (A1d) as:

$$\left(P - P_w\right)\cdot\frac{\partial q_f}{\partial P} = q_h - (1+\lambda)\cdot\left(\frac{\partial MC\left(q_h, e-\theta\right)}{\partial q_h}\cdot q_h\right)\cdot\left(\frac{\partial q_h}{\partial P}\right) \tag{A1e}$$

Because each firm is a price-taker, we have:

$$\frac{\partial MC\left(q_h, e-\theta\right)}{\partial q_h}\cdot\frac{\partial q_h}{\partial P} = 1 \tag{A1f}$$

Substituting (A1f) into (A1e) yields the optimal complete information tariff:

$$t^{CI} = P - P_w = -l \cdot \frac{q_h}{\frac{\P q_f}{\P P}} \quad \textbf{(A1g)}$$

Dividing by the optimal domestic price P^* and rearranging yields the value of the political shadow price on the domestic profit constraint:

$$l = \left[\frac{-(P_w - P^*)}{P^*}\right] \cdot \frac{h}{b} = \left[\frac{-(P_w - P^*)}{P^*}\right] \cdot \frac{e}{x} \quad \textbf{(A1h)}$$

With:

$$b = \frac{q_h}{q_f}, x = -\frac{\P q_h}{\P q_f}, h = -\frac{P \cdot \frac{\P q_f}{\P P}}{q_f}, e = \frac{P \cdot \frac{\P q_h}{\P P}}{q_h}$$

Appendix 2: Second-order conditions for incentive-compatibility with asymmetric information:

Let $e(q) = e(q, p(q), q_h(q))$ be the effort needed to earn a profit $p(q)$ when the supply is $q_h(q)$ and assume that: $e_q > 0, e_p > 0, e_{qh} < 0, e_{qp} < 0, e_{qqh} < 0,$

Assume that the industry is lying about its cost type. In this case, its effort will be: $e(\tilde{q}, q) = e(q, p(\tilde{q}), q_h(\tilde{q}))$ where $\tilde{q} - q$ is the degree of the lie.

In this case, the rent from lying is:

$$B(\tilde{q}, q) = p(\tilde{q}) - K(e(q, p(\tilde{q}), q_h(\tilde{q}))) \tag{A2a}$$

Truth-telling implies: $B_{\tilde{q}}(\tilde{q}, q) = 0,\ B_{\tilde{q}\tilde{q}}(\tilde{q}, q) < 0$ which is equivalent to:

$$B_{\tilde{q}}(\tilde{q}, q) = 0,\ B_{\tilde{q}q}(\tilde{q}, q) > 0 \tag{A2b}$$

because $dB_{\tilde{q}}(\tilde{q}, q) = 0 = B_{\tilde{q}\tilde{q}}(\tilde{q}, q) + B_{\tilde{q}q}(\tilde{q}, q)$

Let us show that $B_{\tilde{q}q}(\tilde{q}, q) > 0$:

$$B_{\tilde{q}}(\tilde{q}, q) = \dot{p}(\tilde{q}) - K_e(e(q, p(\tilde{q}), q_h(\tilde{q}))) \cdot \frac{d}{d\tilde{q}} e(q, p(\tilde{q}), q_h(\tilde{q})) \tag{A2c}$$

$$B_{\tilde{q}q}(\tilde{q}, q) = -K_{ee}\left(e_p \frac{dp}{dq} + e_{q_h} \frac{dq_h}{dq}\right) \cdot e_q - K_e\left(e_{qp} \frac{dp}{dq} + e_{qq_h} \frac{dq_h}{dq}\right) \cdot e_q \tag{A2d}$$

We have $B_{\tilde{q}q}(\tilde{q}, q) > 0$ if $\frac{dq_h(q)}{dq} > 0$. The domestic supply has to be a increasing function of the cost type when the adjustment program takes place for the second-order conditions to be satisfied. This will be the case if the tariff is an increasing function of the cost type.

Appendix 3: Safeguard tariff with asymmetric information

The government's problem with asymmetric information will be:

$$\underset{P(.),e(.)}{Max}\ E(W) = \underset{P(.),e(.)}{Max} \int_{q-}^{q+} \left\{ \int_P^{\infty} Q(z)\cdot dz + (1+l)\cdot\left(p\left(q_h, e-q\right) - K(e)\right) + \left(P - P_w\right)\cdot q_f(P) - l\cdot B(q) \right\} \cdot g(q)\cdot dq$$

subject to:

$$\frac{dB(q)}{dq} = K_e \cdot \frac{p_q}{p_e} \leq 0 \qquad \textit{(PIC)}$$

$$B\left(q^+\right) = 0 \qquad \textit{and} \qquad B(q) > 0 \ \textit{for}\ q \in \left[q^-, q^+\right] \qquad \textit{(PR)}$$

The Lagrangian associated with the maximization problem is:

$$L = \begin{bmatrix} \left[\int_P^{\infty} Q(z)\cdot dz + (1+l)\cdot\left(p\left(q_h, e-q\right) - K(e)\right) + \left(P - P_w\right)\cdot q_f(P) - l\cdot B(q)\right]\cdot g(q) \\ + m(q)\cdot\left(K_e \cdot \frac{p_q}{p_e}\right) + \dot{m}(q)\cdot B(q) \end{bmatrix} \cdot dq - m\left(q^+\right)\cdot B\left(q^+\right) \qquad \textbf{(A3a)}$$

where $m(q)$ is the co-state variable associated with the state equation (PIC).

Let H be the Hamiltonian associated with the Lagrangian L.

$$H(B, P, e, m, q) = \begin{bmatrix} \int_P^{\infty} Q(z)\cdot dz + (1+l)\cdot\left(p\left(q_h, e-q\right) - K(e)\right) \\ + \left(P - P_w\right)\cdot q_f(P) - l\cdot B(q) \end{bmatrix} \cdot g(q) + m(q)\cdot\left(\frac{dK(e)}{de}\cdot\frac{p_q}{p_e}\right) \qquad \textbf{(A3b)}$$

By rewriting L, we obtain:

$$L = \left[H(B, P, e, m, q) + \dot{m}(q)\cdot B(q)\right]\cdot dq - m\left(q^+\right)\cdot B\left(q^+\right) \qquad \textbf{(A3c)}$$

Let $g(q) = \left(P(q), e(q)\right)$ be the control vector.

A necessary condition for L to be a maximum is that the change in L vanishes:

$$dL = \int_{q^-}^{q^+} \left[\frac{\P H}{\P g} \cdot dg + \left(\frac{\P H}{\P B} + \dot{m}(q) \right) \cdot dB(q) \right] \cdot dq - m\left(q^+\right) \cdot dB\left(q^+\right)$$

The change in the value of L vanish if:

$\frac{\P H}{\P P} = 0, \quad \dot{m}(q) = -\frac{\P H}{\P B}, \qquad m\left(q^+\right) \cdot B\left(q^+\right) = 0, \quad m\left(q^-\right) = 0$ because the terminal value $B\left(q^-\right)$ is free.

This yields the necessary conditions for optimality:

$$\frac{\P H}{\P P(q)} = \left(-q_h + \left(P - P_w \right) \cdot q'_f + (1+l) \frac{\P p\left(q_h, e-q\right)}{\P P(q)} \right) \cdot g(q) + m(q) \cdot \frac{\P}{\P P(q)} \left(K_e \frac{p_q}{p_e} \right) = 0$$

$$\frac{\P H}{\P e(q)} = m(q) \cdot \left(\left[\frac{\P}{\P e} \left(\frac{p_q}{p_e} \right) \cdot K_e + \left(\frac{p_q}{p_e} \right) \cdot K_{ee} \right] \right) + (1+l) \cdot \left(p_e\left(q_h, e-q\right) - K_e(e) \right) \cdot g(q) = 0$$

$$-\frac{\P H}{\P B(q)} = \dot{m}(q) = l \cdot g(q)$$

Using the transversality condition, $m\left(q^-\right) = 0$, we get $m(q) = l \cdot G(q)$

This yields:

$$(1+l) \cdot \left(p_e\left(q_h, e-q\right) - K_e(e) \right) \cdot g(q) = -l \cdot G(q) \cdot \left(\left[\frac{\P}{\P e} \left(\frac{p_q}{p_e} \right) \cdot K_e + \left(\frac{p_q}{p_e} \right) \cdot K_{ee} \right] \right) \qquad \textbf{(A3d)}$$

$$\frac{P^* - P_w}{P^*} = l \left(\frac{b}{h} + \frac{1}{P} \cdot \frac{\P K}{\P e} \cdot \frac{\P}{\P q_f} \left[-\frac{p_q}{p_e} \right] \cdot \frac{G(q)}{g(q)} \right) \qquad \textbf{(A3e)}$$

Endnotes

---

1 Similar safeguard clauses can be found in preferential trading agreements such as NAFTA and Mercosur.

2 Article VII of the Uruguay Round Agreement on Safeguards (1994).

3 See Baldwin (1989), Bhagwati (1988), Hillman (1989), Moore (1990), Nelson (1988), and Rodrik (1995) for surveys of the endogenous protection literature and industry response to import competition.

4 This is in contrast to other measures such as antidumping and countervailing duty measures which, at least in principle, are not designed to protect domestic industries from shifting comparative advantage but instead insulate them from alleged "unfair" trade practices.

5 See Dinopoulos, et al. (1995) for optimal policy when a firm's learning-by-doing abilities are unobservable.

6 Feenstra and Lewis (1991) analyze tariffs in a pure exchange economy when domestic agents have private information about their endowments. They find that if the government is constrained by ensuring Pareto gains from trade, a non-linear tariff structure will result.

7 We ignore the compensation required under the safeguard clause as required under Article XIX of the GATT. See Moore and Suranovic (1993) for a model with GATT-consistent safeguard compensation schemes.

8 See Myerson (1979).

9 In this program, we take the level of effort as the control variable. Indeed, the control variable is $p(\cdot)$ but if we assume that $p(\cdot) = y(e-q) \cdot z(q_h)$ where the functions y(.) and z(.)are observable, the two approaches are equivalent because π(.) can be immediately deduced from the value of e(.)

10 While the discussion focused on effort to reduce costs directly, a referee has pointed out that it could also be altered to analyze incentives for changing a whole range of economic activities affecting costs within an import-competing firm. These might include work practices, adoption of new technologies, worker training, etc.