**When and Why do Domestic
Respondents Oppose AD Petitions?**

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Abstract:

In the evolving global trade environment where traditional forms of protection have been falling as a result of multilateral trade agreements such as the Uruguay Round and NAFTA, antidumping policy has quickly become the protective policy instrument of choice. In the United States, there is evidence that domestic non-filing firms do not always support dumping investigations. In the absence of information asymmetries, domestic fims have an unambiguous incentive to support petitions filed by other domestic producers. We argue that in cases where the respondent is not a significant importer or exporter, the most plausible explanation is that non-support acts as a costly signal of private information.

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> " ... at Weldbend we believe that the way to combat foreign competition is to invest in the most modern equipment, the most efficient production methods, and the most dedicated people in the world – and to treat the customer fairly. We have done all of these things, and that is why we can compete in the market. We do not need government help."
>
> – James J. Coulas, Sr.
> President, Weldbend Corporation
> from March 9, 1994 response to
> ITC summons (U.S. I.T.C., 1995)

The gain from antidumping protection cannot lower profits for firms which do not import the affected commodity and has enormous upside potential for firms in some industries. But, opposing an anti-dumping petition can significantly lower the probability of a positive finding with the attendant duty. Nonetheless, firms which would seemingly benefit from a successful anti-dumping petition do not always support it, opting instead for a "neutral" or "opposed" stand, which means they do not support the petition. For example, in the case from which the introductory quotation comes from, Weldbend Corporation did not support the petition even though it was the largest domestic producer in the industry, accounting for about one-third of domestic production in 1993. In response, the petitioning firms in the industry argued that Weldbend should be disqualified as a "related party" for fear that if included in the industry the chances of obtaining tariff protection would be reduced. Nevertheless, the International Trade Commission ruled that Weldbend was a related party (U.S. I.T.C., 1995, p. I–9, esp. footnotes 27 and 32). Eventually, the Commission also concluded that the foreign competition was not the cause of injury to the domestic competitors.

At first face, opposition to an antidumping petition seems odd. If there is a chance of eliminating some foreign competition, why not do so? Supporting an antidumping petition can be more costly than opposing it,[1] however, since it is presumably the higher cost, more marginal firms that seek the protection, and so bear most of the costs of pursuing the action. It would thus seem that any other firms which are not so marginal would gain even more than the filers from industry protection which leads to a price rise. Of course, it could be that some import-competing firms are also importers of related components or exporters that fear retaliation abroad. But this was not so in the case cited above[2] and apparently is not so in other cases, leaving us with a puzzle.

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[1]Non-support can reduce the likelihood of an affirmative decision in the preliminary investigation. If the Commission votes affirmative in the preliminary hearing then all domestic producers incur further costs.

[2]On the basis of the investigation record, International Trade Commission found that Weldbend was not an importer or exporter of the product or the components of the

We propose an explanation of this puzzle based on signaling theory. In particular we present a model of imperfect competition wherein a low cost respondent[3] can oppose the petition to credibly signal to its rivals that it is indeed a low cost firm, thus gaining market share at the expense of losing the benefits of tariff protection. But it is just this costly loss of protection that makes the signal so credible. Thus, reminiscent of Gruenspecht (1988) and as well as more recent examples (e.g., Blonigen, 1999; Prusa, 1992; Staiger and Wolak, 1992), the mere existence of certain trade laws change the payoff structure confronting firms and thus the nature of their strategic interactions.

The next Section sets the institutional context with a brief overview of anti-dumping and countervailing duty procedures. Section II presents the model and Section III derives the conditions for profit maximization when the cost structure of one of the firms is private information. Section IV then investigates equilibria and we establish the conditions for the existence of a unique signaling equilibrium using the Cho-Kreps notion of Intuitive Criterion. We then construct an example using linear demand to provide an illustration of our results. In Section V, we discuss an extension which allows for firms to communicate, prior to the filing of the petition, and demonstrate that signaling behavior may be quite prevalent, even if cases such as Weldbend are rare. In Section VI, we evaluate the robustness of our results by considering a modification of our model where firms compete in prices rather than output. Finally, in Section VII, we offer some conclusions.

I   The Institutional Context

The GATT, as administered by the WTO, sanctions protective duties for industries which are confronted with "a product introduced into the commerce of another country at less than its normal value." This includes both "dumping" and "subsidization." If a firm or group of firms in an industry files a petition, an investigation begins. Now, a positive finding depends on both finding a margin below fair value and making a determination of injury. (In the United States the Department of Commerce does the former and the International Trade Commission the latter.)

It is the injury determination on which we focus. Part I of Article VI of the GATT speaks to injury and the investigation. The investigators are required to consider "all relevant economic factors and indices having a bearing on the state of the industry" and determine that the unfairly priced imports are indeed the cause of injury to the domestic industry as

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product or affiliated in any way with a corporate entity that was involved in trading the product internationally (U.S. I.T.C., 1995).

[3]Here and throughout the remainder of the text, we use the term respondent to refer to non-petitioning domestic producer whereas, institutionally, it is frequently used to refer to the subject importers and foreign producers.

opposed to the domestic competition of the petitioning firms. In particular, the investigators are admonished to consider "the degree of support for, or opposition to the application expressed by domestic producers of the like product, that the application has been made by or on the behalf of the domestic industry." Thus, a firm in the industry not at least expressing support can be quite detrimental to a successful petition.

In the next section we will build on this institutional context by assuming that all parties are aware that non-support of the petition can be destructive to a positive finding with the attendant protection.

II The Model

Consider a model of imperfect international competition with two domestic firms, 1 and 2, facing foreign competition for whom, for simplicity, output is fixed. Assume that the situation is such that firm 2 has filed a dumping petition against foreign producers and that firm 1 can then choose to support or to oppose firm 2's petition.[4] Once firm 1 has decided whether to support or oppose the petition, the outcome of the dumping investigation is determined. Finally, firms 1 and 2 compete.

Assume that firm 1's marginal cost, c^1, is known only to itself but for simplicity firm 2's marginal cost, c^2, is common knowledge.[5] Firm 2's prior regarding firm 1's marginal cost is that with probability η, firm 1 has cost $c^1 = c^L$ and with probability $1 - \eta$, firm 1 has cost $c^1 = c^H$ where $c^H > c^L$. Let $p(Q)$ be the domestic market inverse demand function. Each firm's profit is,

$$\pi^i = (p(q^1 + q^2 + q^f) - c^i)q^i \qquad (1)$$

where q^1 and q^2 are firms 1 and 2's outputs and q^f is the level of foreign output. Foreign output is exogenously determined and is dependant on the outcome of the dumping investigation. Assume that the standard strategic substitutes assumption holds (i.e., $\partial^2 \pi^i / \partial q^i \partial q^j \equiv \pi^i_{ij} < 0$ for $i, j = 1, 2$ and $i \neq j$). Firms maximize profits through their choices of output, given their expectations.

In the event of a successful dumping investigation, foreign imports are fully excluded so that $q^f = 0$. If the dumping investigation is unsuccessful, foreign imports are not excluded so that $q^f = q^* > 0$.[6] The probability of a successful investigation depends on firm 1's marginal cost and its decision

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[4]In reality, respondents can also take a neutral position (U.S. I.T.C., 1999), however, for simplicity, we restrict this to a binary choice with the interpretation that neutrality is equivalent to opposition.

[5]The essential ingredient to our analysis is that firm 1's cost is private information. Allowing for asymmetric information on firm 2's cost complicates the analysis but does not change the basic story.

[6]Using a simple example (Section IV), we demonstrate that the assumption that foreign
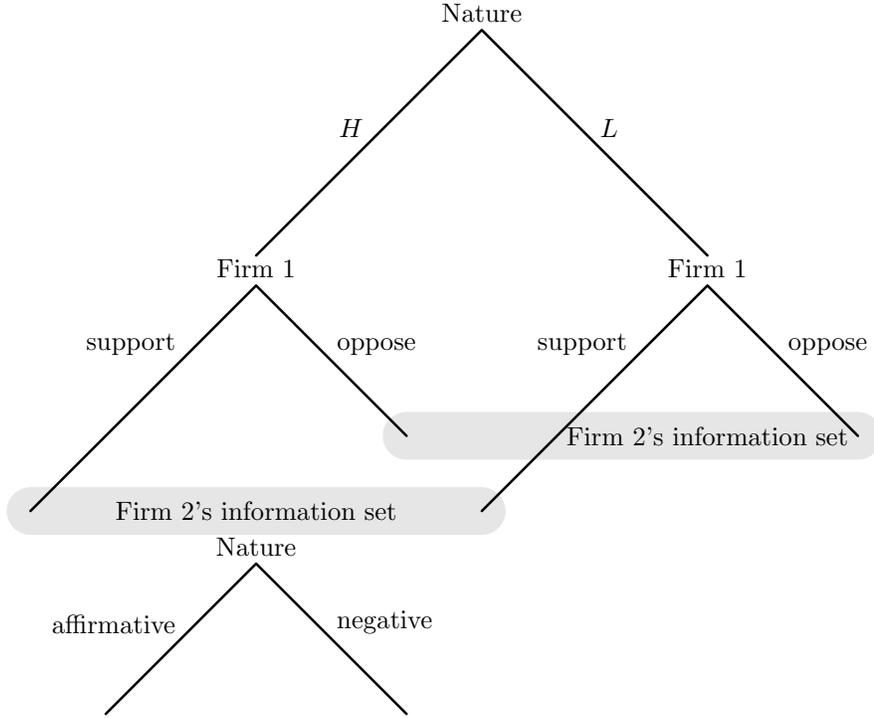
Figure 1: Pre-competition game tree

over whether or not to be in favor of the petition. If firm 1 supports the petition then the probability of a successful investigation is γ^L if firm 1 has cost c^L and γ^H if firm 1 has cost c^H. To be on record as being in opposition to the petition, we assume, casts doubts on the merits of the case and therefore has a significant negative impact on the likelihood of an affirmative judgement. Thus we assume that if firm 1 opposes the petition then the probability of a successful investigation is 0. One of the requirements for an affirmative decision in a dumping investigation is that domestic firms should suffer injury due to dumping. Higher cost firms are more likely to be injured and therefore the probability of an affirmative decision should be greater. That is, $\gamma^H > \gamma^L$.

Finally, assume the there is some $\bar{Q}$ such that for $Q \geq \bar{Q}$, $p(Q) \leq c^L$. This implies that there will exist some sufficiently large q^* such that firm 1 prefers to support the dumping investigation.

The structure of the game is as follows (see Figure 1). In the first stage, firm 1 decides whether or not to support the investigation, based on its cost and its expectations regarding firm 2's behavior. The outcome of the

production is exogenously specified is of no consequence. Using linear demands we show that our results generalize to allowing for a foreign firm which behaves strategically.

investigation is then determined by 1's decision whereupon firm 2 updates its beliefs over firm 1's cost, c^1. Finally, firms 1 and 2 compete in output.

III   Profit maximization

In equilibrium, firm 1's output is a function of its marginal cost so let q^L be the low cost firm's output and q^H be the high cost firm's output. Since firm 1 faces no uncertainty, firm 1's first and second order conditions are given by

$$\frac{\partial \pi^t}{\partial q^t} = p - c^t + q^t p' = 0 \tag{2}$$

$$\frac{\partial^2 \pi^t}{(\partial q^t)^2} \equiv \pi_{11}^t = 2p' + q^t p'' < 0. \tag{3}$$

for $t = L, H$.

Given firm 1's first stage decision and the outcome of the dumping investigation, firm 2 updates its priors over firm 1's marginal cost. Let these updated priors be given by η^*.

Given beliefs, η^*, and firm 1's outputs, q^L and q^H, firm 2 chooses q^2 to maximize

$$E\pi^2 = \eta^*[p(q^L + q^2 + q^f) - c^2]q^2 + (1 - \eta^*)[p(q^H + q^2 + q^f) - c^2]q^2 \tag{4}$$

where $q^f = 0$ or $q^f = q^*$ depending on the outcome of the dumping investigation. Firm 2's first and second order conditions for profit maximization are

$$\frac{\partial E\pi^2}{\partial q^2} = \eta^*(p^L - c^2 + q^2 p^{L\prime}) + (1 - \eta^*)(p^H - c^2 + q^2 p^{H\prime})$$
$$= \eta^* \pi_2^{2L} + (1 - \eta^*)\pi_2^{2H} = 0 \tag{5}$$

$$\frac{\partial^2 E\pi^2}{(\partial q^2)^2} = \eta^*(2p^{L\prime} + q^2 p^{L\prime\prime}) + (1 - \eta^*)(2p^{H\prime} + q^2 p^{H\prime\prime}) < 0. \tag{6}$$

where $p^t = p(q^t + q^2 + q^f)$, $p^{t\prime} = p'(q^t + q^2 + q^f)$, $p^{t\prime\prime} = p''(q^t + q^2 + q^f)$ and π^{2t} is firm 2's profits if firm 1 is of type t. Given type L and H outputs, q^L and q^H, equation (5) defines firm 2's optimal output given its beliefs about firm 1's costs and equilibrium output. When $0 < \eta^* < 1$ and $q^L > q^H$, notice that, by the assumption of strategic substitutes, in order for the first order condition to hold, it must be the case that $\pi_2^{2L} < 0$ and $\pi_2^{2H} > 0$.

A second stage equilibrium is thus a triplet q^L, q^H and q^2 such that i) given q^2, firm 1's type contingent output, q^L and q^H, satisfy equation (2)

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when $c^1 = c^L$ and $c^1 = c^H$ and ii) given η^*, q^L and q^H firm 2's output, q^2, satisfies (5). Since the outcome of the dumping investigation is determined prior to competing, the equilibrium values of q^L, q^H and q^2 are functions of firm 2's beliefs, η^*, and the outcome of the dumping investigation, q^f.

Totally differentiating this system with respect to q^L, q^H, q^2, q^f, c^L, c^H, c^2 and η^* yields:

$$\pi_{11}^t dq^t + \pi_{12}^t dq^2 - dc^t + \pi_{1f}^t dq^f = 0 \tag{7}$$

$$\eta^* \pi_{21}^{2L} dq^L + (1 - \eta^*)\pi_{21}^{2H} dq^H + (\eta^* \pi_{22}^{2L} + (1 - \eta^*)\pi_{22}^{2H}) dq^2$$
$$- dc^2 + (\eta^* \pi_{2f}^{2L} + (1 - \eta^*)\pi_{2f}^{2H}) dq^f + (\pi_2^{2L} - \pi_2^{2H}) d\eta^* = 0 \tag{8}$$

where π^{2t} is firm 2's profits when facing a competitor of type t. These total differentials can be rewritten in matrix form as:

$$\begin{pmatrix} \pi_{11}^L & 0 & \pi_{12}^L \\ 0 & \pi_{11}^H & \pi_{12}^H \\ \eta^* \pi_{21}^{2L} & (1 - \eta^*)\pi_{21}^{2H} & \eta^* \pi_{22}^{2L} + (1 - \eta^*)\pi_{22}^{2H} \end{pmatrix} \begin{pmatrix} dq^L \\ dq^H \\ dq^2 \end{pmatrix} =$$

$$\begin{pmatrix} 1 & 0 & 0 & -\pi_{1f}^L & 0 \\ 0 & 1 & 0 & -\pi_{1f}^H & 0 \\ 0 & 0 & 1 & -(\eta^* \pi_{2f}^{2L} + (1 - \eta^*)\pi_{2f}^{2H}) & -(\pi_2^{2L} - \pi_2^{2H}) \end{pmatrix} \begin{pmatrix} dc^L \\ dc^H \\ dc^2 \\ dq^f \\ d\eta^* \end{pmatrix} \tag{9}$$

and used to derive the following comparative static results:

$$\frac{dq^t}{dc^t} = \frac{\pi_{11}^{t'}(\eta^* \pi_{22}^{2L} + (1 - \eta^*)\pi_{22}^{2H}) - \eta^{t'*}\pi_{12}^{t'}\pi_{21}^{2t'}}{D} < 0$$

$$\frac{dq^t}{dc^{t'}} = \frac{\eta^{t'*}\pi_{12}^t \pi_{21}^{2t'}}{D} < 0 \qquad \frac{dq^t}{dc^2} = \frac{-\pi_{11}^{t'}\pi_{12}^t}{D} > 0$$

$$\frac{dq^t}{dq^f} = \frac{-\eta^* \pi_{12}^t \pi_{11}^{t'}(\pi_{22}^{2L} - \pi_{2f}^{2L}) - (1 - \eta^*)\pi_{12}^t \pi_{11}^{t'}(\pi_{22}^{2H} - \pi_{2f}^{2H})}{D} \in (-1, 0)$$

$$\frac{dq^t}{d\eta^*} = \frac{\pi_{12}^t \pi_{11}^{t'}(\pi_2^{2L} - \pi_2^{2H})}{D} > 0$$

$$\frac{dq^2}{dc^t} = \frac{-\eta^{t*}\pi_{11}^{t'}\pi_{21}^{2t}}{D} > 0 \qquad \frac{dq^2}{dc^2} = \frac{\pi_{11}^L \pi_{11}^H}{D} < 0$$

$$\frac{dq^2}{dq^f} = \frac{-\eta^* \pi_{11}^H(\pi_{11}^L \pi_{2f}^{2L} - \pi_{1f}^L \pi_{21}^{2L}) - (1 - \eta^*)\pi_{11}^L(\pi_{11}^H \pi_{2f}^{2H} - \pi_{1f}^H \pi_{21}^{2H})}{D} \in (-1, 0)$$

$$\frac{dq^2}{d\eta^*} = \frac{-\pi_{11}^L \pi_{11}^H(\pi_2^{2L} - \pi_2^{2H})}{D} < 0$$

$$\tag{10}$$

for $t, t' = L, H$ and $t \neq t'$ and where $\eta^{t*} = \eta^*$ if $t = L$, $\eta^{t*} = 1 - \eta^*$ if $t = H$ and $D = \eta^* \pi_{11}^H(\pi_{11}^L \pi_{22}^{2L} - \pi_{12}^L \pi_{21}^{2L}) + (1 - \eta^*)\pi_{11}^L(\pi_{11}^H \pi_{22}^{2H} - \pi_{12}^H \pi_{21}^{2H}) < 0$.

Thus as is standard, an increase in own costs reduces own output while increasing rival output. In particular, this implies that $q^L > q^H$ so that if $\eta^* \in (0, 1)$ then $\pi_2^{2L} < 0$ and $\pi_2^{2H} > 0$. It follows that an increase in firm 2's belief that firm 1 is a low cost firm increases output for both high *and* low cost firms while it decreases firm 2's output. Finally, an increase in foreign output, q^f, results in a decline in output for all domestic firms.

Now, differentiating profits with respect to q^f and η^* yields

$$\frac{\partial \pi^t}{\partial q^f} = \pi_2^t \frac{\partial q^2}{\partial q^f} + \pi_f^t < 0$$

$$\frac{\partial \pi^t}{\partial \eta^*} = \pi_2^t \frac{\partial q^2}{\partial \eta^*} > 0$$

$$\frac{\partial E\pi^2}{\partial q^f} = \eta^* \left(\pi_1^{2L} \frac{\partial q^L}{\partial q^f} + \pi_f^{2L} \right) + (1 - \eta^*) \left(\pi_1^{2H} \frac{\partial q^H}{\partial q^f} + \pi_f^{2H} \right) < 0 \quad (11)$$

$$\frac{\partial E\pi^2}{\partial \eta^*} = \eta^* \pi_1^{2L} \frac{\partial q^L}{\partial \eta^*} + (1 - \eta^*) \pi_1^{2H} \frac{\partial q^H}{\partial \eta^*} + (\pi^{2L} - \pi^{2H}) < 0$$

That is, an increase in foreign output lowers profits for all domestic competitors so that in the absence of signaling considerations, both types strictly prefer to support the dumping investigation. However, this is clouded by the incentive for firm 1 to manipulate firm 2's beliefs. In particular, firm 1 would like to increase η^* or firm 2's belief that firm 1 is a low cost producer.

IV   Equilibria

Pooling

A pooling equilibrium occurs when, regardless of its type, firm 1 either always supports or always opposes the dumping investigation.

Consider first the potential equilibrium where both type L and type H firms always support the dumping investigation. Since firm 2 learns nothing from firm 1's first stage action, its only new information comes from the result of the investigation. In particular, if firm 1 always supports the investigation then if firm 2 observes a successful investigation, her Bayes updated belief that firm 1 is of type L is

$$\eta_s^* = \frac{\eta \gamma^L}{\eta \gamma^L + (1 - \eta) \gamma^H} \quad (12)$$

and if it observes an unsuccessful investigation, its updated belief that firm 1 is of type L is

$$\eta_u^* = \frac{\eta(1 - \gamma^L)}{\eta(1 - \gamma^L) + (1 - \eta)(1 - \gamma^H)} \quad (13)$$

Since, $\gamma^L < \gamma^H$, it follows that after a successful investigation in which firm 1 supported the petition, firm 2's believes that firm 1 is of type L with lower probability than if the investigation were unsuccessful (i.e., $\eta_s^* < \eta_u^*$).

In an equilibrium where both types of firm 1 support the petition, firm 1's expected profits are given by

$$E\pi^t = \gamma^t[p(q^t(\eta_s^*,0) + q^2(\eta_s^*,0)) - c^t]q^t(\eta_s^*,0)$$
$$+ (1-\gamma^t)[p(q^t(\eta_u^*,q^*) + q^2(\eta_u^*,q^*) + q^*) - c^t]q^t(\eta_u^*,q^*) \quad (14)$$

where $q^t(\eta^*,q^f)$ is firm t's equilibrium output conditional on firm 2's beliefs of η^* and foreign production of q^f. A firm of type t compares this to the profits it would get by deviating and opposing the dumping investigation.

We know that by opposing the petition, firm 1 ensures that the dumping investigation fails and therefore $q^f = q^*$. In order to compute the deviation profits, we must formulate firm 2's *out of equilibrium beliefs*. Since in equilibrium, deviations are not observed Bayes rule provides no restrictions on beliefs. Thus to find the most favorable conditions for the existence of a pooling equilibrium, assume that upon observing unanticipated behavior by firm 1, firm 2 believes with certainty that firm 1 is of type H (i.e., $\eta^* = 0$). Firm 1's deviation profits are therefore

$$\pi^t = [p(q^t(0,q^*) + q^2(0,q^*) + q^*) - c^t]q^t(0,q^*) \quad (15)$$

Given our comparative static results ($d\pi^t/d\eta^* > 0$ and $d\pi^t/dq^f < 0$), this is clearly the worst possible outcome for firm 1 so that (14) is greater than firm 1's deviation profits. Therefore, given these beliefs,

Remark 1 *There exists a pooling equilibrium where both types of firm 1 support the investigation.*

Now consider the potential pooling equilibrium where firm 1 always opposes the investigation. In this case, since both types choose the same action in equilibrium, firm 2 again acquires no new information. Furthermore, since firm 1 opposes the petition, the investigation always fails and so firm 2 also learns nothing from the outcome of the investigation and $\eta^* = \eta$. Thus firm 1's equilibrium profits are given by

$$\pi^t = [p(q^t(\eta,q^*) + q^2(\eta,q^*) + q^*) - c^t]q^t(\eta,q^*) \quad (16)$$

Again, to compute firm 1's deviation profits we must formulate firm 2's beliefs in the event of observing unexpected behavior. As before, suppose that upon seeing out-of-equilibrium behavior, firm 2 assumes the worst and believes with certainty that firm 1 has cost c^H so that $\eta^* = 0$. Firm 1's profits are therefore

$$E\pi^t = \gamma^t[p(q^t(0,0) + q^2(0,0)) - c^t]q^t(0,0)$$
$$+ (1-\gamma^t)[p(q^t(0,q^*) + q^2(0,q^*) + q^*) - c^t]q^t(0,q^*) \quad (17)$$

This is a weighted sum of profits where with probability γ^t, the investigation is successful and with probability $1 - \gamma^t$, the investigation is unsuccessful. In the event of a failed investigation, firm 1's profit (the second term of the right hand side of (17)) is dominated by (16). However, if the investigation is successful, firm 1's profits (the first term of the right hand side) may dominate (16). In particular, given $q^* > 0$, if η is sufficiently small then the first term can be greater than (16). Similarly, for a given η, if q^* is sufficiently large then the first term will be greater than (16). In these cases, for sufficiently large γ^H, (17) will be greater than (16), and the strategy profile where firm 1 opposes the investigation cannot constitute an equilibrium.

Remark 2 *There exists a pooling equilibrium where both types of firm 1 oppose the investigation provided that η is not too small and q^* and γ^H are not too large.*

That is, when η is relatively large, the benefit to a type H firm of continuing to pool is large and when q^* and γ^H are relatively small, the cost of pooling is small. Since the benefit from pooling is greater than the cost, the H type firm is willing to give up the possibility of eliminating the foreign competition in order to keep firm 2 uninformed.

Signaling

In a separating or *signaling* equilibrium, it must either be the case that L types support the petition and H types oppose it, or else L types oppose the petition while H types support it.

In the first case, if firm 2 observes non-support then Bayes rule dictates that it should believe firm 1 to be of type L with probability zero or $\eta^* = 0$. However, as we have seen from the comparative static results, the profits of both types are decreasing in η^*. In particular, type H firms can imitate type L firms by supporting the investigation and be thought to be type L with probability one. Furthermore, by supporting the petition, they also increase the chance of a successful investigation from zero to γ^H. Thus type H firms are strictly better off supporting the dumping investigation and therefore a signaling equilibrium cannot have type L firms support while type H firms oppose the investigation.

Remark 3 *There does not exist a signaling equilibrium where type L firms support the investigation and where type H firms oppose the investigation.*

In the second case, if firm 2 observes non-support then she believes firm 1 to be of type L with probability one. A type L firm's equilibrium profits are

$$\pi^L = [p(q^L(1, q^*) + q^2(1, q^*) + q^*) - c^L]q^L(1, q^*) \tag{18}$$

If a type L firm deviates by supporting the petition, firm 2 believes that firm 1 is of type H with probability 1. As a result, a type L firm 1's deviation profits are:

$$\pi^L = \gamma^L[p(q^L(0,0) + q^2(0,0)) - c^L]q^L(0,0)$$
$$+ (1 - \gamma^L)[p(q^L(0,q^*) + q^2(0,q^*) + q^*) - c^L]q^L(0,q^*) \quad (19)$$

The profits from an unsuccessful investigation (the second term of the right hand side of (19)) is clearly dominated by (18). The profits in the event of a successful investigation (the first term) will dominate (18) if q^* is sufficiently large. In this case, when γ^L is sufficiently large, a type L firm 1 will have an incentive to deviate from the equilibrium. Thus one necessary condition for a signaling equilibrium to exist is that q^* and γ^L should not be too large (i.e., the cost of sending the signal is small). Note that even when q^* is large, if γ^L is sufficiently small, type L firms will have no incentive to deviate.

Similarly, a type H firm's equilibrium profits are

$$\pi^H = \gamma^H[p(q^H(0,0) + q^2(0,0)) - c^H]q^H(0,0)$$
$$+ (1 - \gamma^H)[p(q^H(0,q^*) + q^2(0,q^*) + q^*) - c^H]q^H(0,q^*) \quad (20)$$

and its deviation profits are:

$$\pi^H = [p(q^H(1,q^*) + q^2(1,q^*) + q^*) - c^H]q^H(1,q^*) \quad (21)$$

In this case, (21) dominates the profits from a failed investigation (the second term in (20)). The profits from a successful investigation (the first term) dominates (21) if q^* is sufficiently large. In this case, provided γ^H is sufficiently large, a type H firm will not find it in its interest to deviate.

Remark 4 *There exists a signaling equilibrium where type L firms oppose the petition and where type H firms support it provided that q^* is sufficiently large, γ^L is sufficiently small and γ^H is sufficiently large.*

The parameters q^* and γ^H need to be large enough to ensure that high cost firms do not have an incentive to imitate low cost firms. The parameter γ^L needs to be small enough that the cost of sending the signal is less than the benefits of the signal. In the parlance of the signaling literature, signals must be costly but the cost of the signal must be lower for "higher" types (in our case, the "high" type is the low cost firm).

Refinements

As is common with signaling games, we have a multiplicity of equilibria. As a result, much effort has been expended in an an attempt to "refine" away

"undesirable" equilibria (see Banks and Sobel, 1987; Cho and Kreps, 1987, for example).

In our model, the Cho-Kreps notion of *Intuitive Criterion*[7] can, under certain parameter configurations, yield a unique equilibrium. In particular, we are interested in conditions under which the signaling equilibrium is the unique equilibrium.

To start with, note the Intuitive Criterion cannot eliminate pure separating or signaling equilibria. To see this, notice that since in the signaling equilibrium, there are no out-of-equilibrium actions, and therefore no out-of-equilibrium beliefs, if an unrefined signaling equilibrium exists, it always survives the Intuitive Criterion (as well as *Divinity*-like refinements). To see that there are conditions under which signaling is the unique equilibrium, note that for sufficiently large q^* and γ^H, a signaling equilibrium will exist but the pooling equilibrium where both types support the petition does not (Remarks 2 and 4).

Now consider the pooling equilibrium where both types of firms support the investigation. The most favorable out-of-equilibrium beliefs for firm 1 are when firm 2 believes that firm 1 is of type L with probability 1 ($\eta^* = 1$). The best payoff attainable by a deviator under such beliefs are

$$\pi^t = [p(q^t(1, q^*) + q^2(1, q^*) + q^*) - c^t]q^t(1, q^*) \tag{22}$$

Given that the investigation failed, this is clearly greater than the equilibrium profits given by the second term of equation (14). However, if q^* is sufficiently large then the after a successful investigation, the equilibrium profits given by the first term of equation (14) are greater than (22). If γ^H is sufficiently large then type H firms cannot gain by deviating, even under the most favorable beliefs. On the other hand, if γ^L is sufficiently small, then under these favorable beliefs, low cost firms would gain by forgoing the investigation. Thus when q^* is large, γ^L is small and γ^H is large, upon observing non-support from firm 1, firm 2 must believe with probability 1, under the Intuitive Criterion, that firm 1 is of type L. As we have just shown, given such beliefs, a type L firm clearly has an incentive to deviate and therefore the pooling equilibrium does not survive the Intuitive Criterion.

Proposition 1 *The signaling equilibrium is the unique equilibrium that survives the Intuitive Criterion provided that q^* is sufficiently large, γ^L is sufficiently small and γ^H is sufficiently large.*

Stronger refinements (e.g., *Divinity*-like refinements (Banks and Sobel, 1987; Cho and Kreps, 1987)) will eliminate the "bad" pooling equilibrium

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[7]Stated non-technically, the Intuitive Criterion says that if there exists some type t which cannot do better by choosing action a, under *any* feasible out-of-equilibrium beliefs, then beliefs which survive the Intuitive Criterion must put probability zero on the event that a type t agent chooses action a. Obviously this is subject to the fact that probabilities must sum to 1 so that if no type can do better then again, any beliefs are feasible.

and will yield unique equilibria, however, they require stronger behavioral assumptions. Since we can obtain conditions for the uniqueness of the signaling equilibrium under the relatively mild refinement of the Intuitive Criterion, we do not formally consider these stronger refinements.

An Example

In order to see more clearly what is going on, consider a special example where market demand is linear and given by $p(Q) = a - bQ$. Furthermore, since analytic solutions are easily attainable, we now endogenize foreign output. Assume that there is a single foreign firm with marginal cost c^f. In the event of a successful investigation, the foreign firm faces a remedial duty of $d^f = d^* > 0$. In the event of an unsuccessful investigation, the foreign firm faces a free trade duty of $d^f = 0$. For the purposes of this example, assume that firm 2 and firm f have common out-of-equilibrium beliefs, η^*.

Solving for the profit maximizing outputs yields:

$$q^t = \frac{a - \eta^* c^L - (1 - \eta^*) c^H - 2c^t + c^2 + (d^f + c^f)}{4b} \tag{23}$$

$$q^2 = \frac{a + \eta^* c^L + (1 - \eta^*) c^H - 3c^2 + (d^f + c^f)}{4b} \tag{24}$$

$$q^f = \frac{a + \eta^* c^L + (1 - \eta^*) c^H + c^2 - 3(d^f + c^f)}{4b} \tag{25}$$

Substituting into profits yields

$$\pi^t = \frac{[a - \eta^* c^L - (1 - \eta^*) c^H - 2c^t + c^2 + (d^f + c^f)]^2}{16b} \tag{26}$$
$$= b(q^t)^2$$

$$E\pi^2 = \frac{[a + \eta^* c^L + (1 - \eta^*) c^H - 3c^2 + (d^f + c^f)]^2}{16b} \tag{27}$$
$$= b(q^2)^2$$

$$E\pi^f = \frac{[a + \eta^* c^L + (1 - \eta^*) c^H + c^2 - 3(d^f + c^f)]^2}{16b} \tag{28}$$
$$= b(q^f)^2$$

Notice that, as with the general specification, output and profits fall with own costs and rise with rival costs. Furthermore, firm 1's output and profits rise and firm 2 and firm f's outputs and profits fall with the posterior

probability that firm 1 is of type L. However, unlike our earlier computations, since foreign output is now endogenous, outputs and profits instead vary with the level of duties levied on the foreign firm. In particular, the output and profits of all domestic firms rises with the level of the duty and foreign output and profits fall with the level of the duty. Now, changing our notation in line with allowing foreign output to be endogenous, let the second argument of $q^t(\cdot, \cdot)$ be the duty, d^f, levied on foreign imports.

In order to make profit comparisons, consider the following transformations of firm 1's expected profits from supporting the investigation. Define $\hat{\gamma}^t$ and $\tilde{\gamma}^t$ to solve:

$$b[\hat{\gamma}^t q^t(\eta_s^*, d^*) + (1 - \hat{\gamma}^t) q^t(\eta_u^*, 0)]^2 = b[\gamma^t q^t(\eta_s^*, d^*)^2 + (1 - \gamma^t) q^t(\eta_u^*, 0)^2] \tag{29}$$

$$b[\tilde{\gamma}^t q^t(0, d^*) + (1 - \tilde{\gamma}^t) q^t(0, 0)]^2 = b[\gamma^t q^t(0, d^*)^2 + (1 - \gamma^t) q^t(0, 0)^2] \tag{30}$$

When $q^t(\eta_s^*, d^*) \neq q^t(\eta_u^*, 0)$, $\hat{\gamma}^t$ and $\tilde{\gamma}^t$ exist and are unique. Furthermore, they are strictly increasing in γ^t with $\hat{\gamma}^t = \tilde{\gamma}^t = 1(0)$ when $\gamma^t = 1(0)$.

Now consider the pooling equilibrium where firm 1 always supports the petition. Firm 1's equilibrium profits are given by equation (14). If firm 1 deviates, the best it can do is if firm 2 believes that firm 1 is of type L with probability 1, yielding profits $bq^t(1, 0)^2$. If

$$\hat{\gamma}^H d^* > [\hat{\gamma}^H(1 - \eta_s^*) + (1 - \hat{\gamma}^H)(1 - \eta_u^*)](c^H - c^L) \tag{31}$$

then $b[\gamma^H q^H(\eta_s^*, d^*)^2 + (1 - \gamma^H) q^H(\eta_u^*, 0)^2] > bq^H(1, 0)^2$ so that even under the most favorable beliefs, a type H firm could never do better than its equilibrium payoff—this condition is satisfied for sufficiently large d^* and sufficiently large $\hat{\gamma}^H$. On the other hand, if

$$[\hat{\gamma}^L(1 - \eta_s^*) + (1 - \hat{\gamma}^L)(1 - \eta_u^*)](c^H - c^L) \geq \hat{\gamma}^L d^* \tag{32}$$

then there exist beliefs under which a type L firm could do better than its equilibrium payoff—this condition can be satisfied if $\hat{\gamma}^L$ is sufficiently small. Thus under such a parameter configuration, if firm 2 observed non-support, it should believe with probability 1 that firm 1 is of type L. If equation (32) holds with strict inequality then a firm of type L will prefer to deviate and therefore when d^* and $\hat{\gamma}^H$ are large and $\hat{\gamma}^L$ is small, the pooling equilibrium where firm 1 always supports the petition does not survive the Intuitive Criterion.

Next, consider the pooling equilibrium where firm 1 always opposes the petition. Firm 1's equilibrium profits are again given by equation (16). Comparing this to (30) we see that when

$$\tilde{\gamma}^t d^* > \eta(c^H - c^L) \tag{33}$$

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for either $t = L$ or $t = H$, it will be the case that $b[\gamma^t q^t(0, d^*)^2 + (1 - \gamma^t q^t(0,0)^2] > bq^t(\eta, 0)^2$ so that a pooling equilibrium where firm 1 always opposes the petition does not exists. This condition is satisfied for firm H when η is sufficiently small and when γ^H and d^* are sufficiently large.

Finally, consider the signaling equilibrium. As already pointed out, the signaling equilibrium always survives the Intuitive Criterion. Furthermore, a signaling equilibrium exists when

$$\tilde{\gamma}^H d^* \geq c^H - c^L \geq \tilde{\gamma}^L d^*. \tag{34}$$

In this case, it is easy to show that $bq^L(1,0)^2 \geq b[\gamma^L q^L(0, d^*)^2 + (1 - \gamma^L)q^L(0,0)^2]$ and $bq^H(1,0)^2 \leq b[\gamma^H q^H(0, d^*)^2 + (1 - \gamma^H)q^H(0,0)^2]$ so that neither type has an incentive to deviate. This condition is satisfied whenever d^* and γ^H are sufficiently large and γ^L is sufficiently small.

To summarize, when d^* and γ^H are sufficiently large and when γ^L is sufficiently small, i) the pooling equilibrium where firm 1 always support the petition, does not survive the Intuitive Criterion, ii) the unrefined pooling equilibrium where firm 1 always opposes the petition fails to exist and iii) the signaling equilibrium exists. Thus under these conditions, the signaling equilibrium is the unique equilibrium which survives the Intuitive Criterion.

This simple example achieves two goals. First, using a concrete example with an analytic solution, we demonstrate precise conditions under which the signaling equilibrium is the unique Intuitive Criterion outcome. Second, it allows us to endogenize the foreign firm's behavior to demonstrate the innocuity of our assumption that foreign outputs are exogenously specified and depend only on the outcome of the dumping investigation. The essential element of this assumption being that after an affirmative investigation, the foreign producers are forced to restrict their output in response to the remedial duties.

V   Observability of Respondent Stances and Pre-play Communication

Although it is easy to find examples of investigations where domestic respondents have taken a neutral or opposed position on dumping investigations there is considerable difficulty in accurately measuring the frequency of such occurrences. In particular, a respondent's opposition can be *confidential business information* which does not appear in the public record and is therefore unobservable to us as researchers. Sometimes overall summary statistics of positions taken by respondent firms are reported, however, whether or not such statistics are reported varies from case to case. Thus it is difficult to accurately gauge the frequency of "neutral" or "opposed" positions.
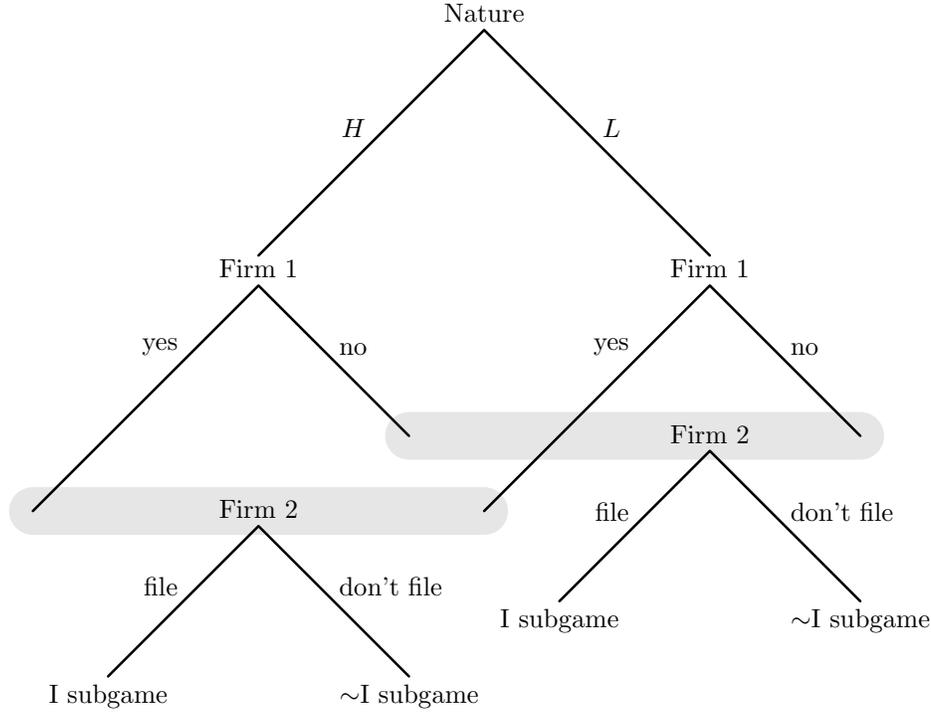
Nature

H   *L*

Firm 1   Firm 1

yes   no   yes   no

Firm 2   Firm 2

Firm 2   file   don't file

file   don't file

I subgame   ∼I subgame

I subgame   ∼I subgame

Figure 2: Preplay communication game tree

This would also seem to suggest that our theory may not be very relevant. In particular, when a firm's position is confidential business information, it is conveyed only to those with a "need to know." Petitioners and respondents themselves do not have a "need to know" and technically do not have access to this information. Thus it would seem that firms which oppose a petition and ask that its opposition be confidential cannot be signaling as we have suggested. However, those with a need to know include the staff working on the investigation, Commissioners *and the counsel for the petitioners and respondents* (U.S. I.T.C., 1998, §207.7(a)(3)). A respondent's stance, while technically confidential, would be difficult to realistically keep confidential. For example, it would be difficult to prosecute a private verbal statement by the counsel for X to the effect that "Y opposed the petition." Even in the absence of unsanctioned private communication between counsel and client, it seems likely that for those directly involved in the case, as the case develops over the course of the investigation, the stances of respondent firms would become apparent. There is thus some question as to whether such confidential business information is truly confidential. In other words, respondent firms may well ask that their stance be kept confidential, knowing that, realistically, it is not in fact confidential.

Moreover, even if respondent opposition to dumping petitions is rare,

behavior that is consistent with our predictions can occur through other channels which are unobservable. Consider an extension to the model where prior to the decision to file a petition, firms can costlessly communicate in an earlier stage.[8] In particular, assume that firms 1 and 2 can discuss their intentions beforehand. For example, suppose that firm 2 is considering whether or not to file an AD petition. Recognizing the impact of firm 1's stance on the likely outcome of the subsequent investigation, firm 2 phones firm 1 in order to gauge its position. In response to firm 2's query, firm 1 can state either 'yes' or 'no.' Upon observing firm 1's response, firm 2 updates its beliefs and then decides whether to file a dumping complaint. If firm 2 files the petition then play proceeds as before. If firm 2 decides not to file a petition, then they compete given firm 2's beliefs at this stage. Assume that participation in an investigation is costly so that if firm 2 files the petition, firms 1 and 2 incur participation cost ε_1 and ε_2.[9] Finally, assume that parameters are such that there is a unique Intuitive Criterion signaling equilibrium in the original game. An illustration of the preplay communication game is given in Figure 2 where the 'I subgame' refers to the continuation subgame where an investigation is conducted and the '$\sim$I subgame' refers to the continuation subgame where it is not conducted. As is typical in cheap-talk games, this extended game has multiple equilibria—communication equilibria and "babbling" equilibria.

In one communication equilibrium, firm 1 truthfully reveals its intentions, stating 'yes' when it plans to support the petition and 'no' when it plans to oppose it.[10] Bayes consistent beliefs therefore have $\eta^* = 1$ when firm 1 says 'no' and $\eta^* = 0$ when firm 1 says 'yes.' Since proceeding to an investigation is costly, when firm 2 observes a 'no' it rationally concludes that it should not file the petition. When firm 2 observes a 'yes,' it knows that firm 1 will support its petition and rationally chooses to file the petition. Furthermore, since participation is costly, given firm 2's equilibrium beliefs and behavior, firm 1 says 'no' when it intends to oppose the petition and 'yes' when it intends to support it. In this equilibrium, the 'signaling' simply moves to an earlier stage with identical but unobservable (to the researcher) informational consequences.

The babbling equilibrium has firm 1 stating 'yes' or stating 'no' in a manner which is uncorrelated with its actual intentions. This is an equilibrium because given that firm 2 believes that firm 1's statement contains no useful

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[8]That is, we allow for cheap-talk prior to the filing decision. See Farrell and Rabin (1996) for an overview of the literature.

[9]Since the International Trade Commission has subpoena power, non-participation is not an option and firm 2 has the ability to unilaterally impose cost ε_1 on firm 1.

[10]Alternatively, there is an equilibrium where firm 1 states 'no' when it plans to support the petition and 'yes' when it plans to oppose it. Furthermore, with more complicated message spaces, other communication equilibria can occur. For example, firm 1 might say 'banana' when it intends to support the petition and 'apple' when in plans to oppose it.

information, firm 1 has no incentive to make an informative statement. Since firm 1's statement is uncorrelated with its type, firm 2's posterior beliefs are unchanged and therefore firm 2 files a dumping petition.

As with our original game, there is a problem with multiple equilibria, however, since participation in an investigation is costly, players have common interests and refinements can pick out the communication equilibrium as being more reasonable (Farrell, 1993; Matthews *et al.*, 1991; Rabin, 1990). Intuitively, one expects that since the communication equilibria Pareto dominate the babbling equilibria, informal preplay communication will be meaningful (messages are both understood and credible) and investigations will be preempted when respondents have low cost. In other words, if an investigation is filed, respondent firms always support the petition.

Since it is natural to believe that firms would attempt to communicate prior to initiating an antidumping action, we need to reconcile the results of this extended game with the fact that respondents are sometimes observed opposing AD petitions. In order to do so, all that is required is weakening the assumption that in the face of opposition, the investigation surely fails. That is, firm 2's prior regarding the probability of a successful investigation when firm 1 opposes the investigation should be non-zero. If this probability is sufficiently large, relative to the participation cost, firm 2 will rationally choose to go forward with the investigation, even if firm 1 could credibly state that it plans to oppose it. Since the petitioners plan to proceed regardless of their beliefs regarding firm 2's intentions, there are no longer common interests in coordinating.[11] Thus, to ensure that any signal sent is credible, firm 2 must "put its money where its mouth is" and incur the cost of opposing the investigation. Returning to our introductory example, it seems unlikely that prior to filing their complaint, the petitioners did not first try to contact Weldbend, the most significant domestic producer. If the petitioners had contacted Weldbend prior to filing their petition then one must surmise that any statements made by Weldbend were not viewed credibly and that Weldbend had no choice but to wait for the investigation before sending the costly signal of its type (opposing the petition).

To summarize, the possibility of unobserved preplay communication suggests that signaling behavior of the sort suggested by our model may be quite prevalent even if, in practice, opposition to AD petitions is infrequent. This signaling can take place through "behind the scenes" discussions, prior to the actual decision over whether or not to file the petition.

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[11]Any preplay discussion is not credible in this case. Suppose to the contrary. In the 'I subgame,' an L firm which had convinced firm 2 that it was of type L would prefer to support the petition. But a type H firm would then also state that they plan to oppose the petition in the first stage, knowing that in the 'I subgame' it can instead support the petition.

VI   Price competition

In order to consider the robustness of our conclusions, we now consider a model of price competition.[12] Suppose that instead of choosing output, firms choose prices and that each firm's demand function is given by $q^i(p^1, p^2, p^f)$ for $i = 1, 2$ where q^i is decreasing in p^i and increasing in p^f and p^j for $j \neq i$. As before, assume that foreign prices are exogenously determined and are dependent of the outcome of the investigation. In particular, in the event of a successful investigation, $p^f = \bar{p}$ and in the event of an unsuccessful investigation, $p^f = \underline{p}$ where of course $\bar{p} > \underline{p}$. Further, for simplicity, suppose that $\partial q^1/\partial p^2 = \partial q^1/\partial p^f$ and $\partial q^2/\partial p^1 = \partial q^2/\partial p^f$. Finally, assume that there is strategic complementarity in price setting so that $\partial^2 \pi^i/\partial p^i \partial p^j > 0$ for $j \neq i$.

Solving the final stage of the model yields the expected comparative static results. Of significance to our analysis are the results that $d\pi^t/dp^f > 0$ and $d\pi^t/d\eta^* < 0$.[13] As before, in the absence of information asymmetries, if compliance is costless, firm 1 strictly prefers to support the investigation. However, notice that firm 1 now prefers to have low η^* as opposed to the earlier case of Cournot competition. That is, firm 1 would like to increase firm 2's belief that it is a high cost firm. As we now show, signaling is difficult to support when firms compete in prices.

Consider again whether or not there can exist a signaling equilibrium— the potential equilibria here are i) when type L firms support the petition and type H firms oppose it and ii) when type L firms oppose the petition and type H firms support it.

Suppose that the first case is an equilibrium. If firm 1 opposes the petition, firm 2 believes with probability 1 that firm 1 is of type H. A type H firm's equilibrium profits are:

$$\pi^H = [p^H(0, \underline{p}) - c^H]q^1(p^H(0, \underline{p}), p^2(0, \underline{p}), \underline{p}) \tag{35}$$

In equilibrium, this must be at least as large as its deviation profits from supporting the petition:

$$\pi^H = \gamma^H[p^H(1, \bar{p}) - c^H]q^1(p^H(1, \bar{p}), p^2(1, \bar{p}), \bar{p})$$
$$+ (1 - \gamma^H)[p^H(1, \underline{p}) - c^H]q^1(p^H(1, \underline{p}), p^2(1, \underline{p}), \underline{p}) \tag{36}$$

Given our comparative statics, the type H firms are willing to signal only if γ^H and $\bar{p}$ are relatively small. On the other hand, a type L firm's expected

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[12]For example, using a model of Cournot competition, Brander and Spencer (1985) showed that an export subsidy is optimal policy. However, Eaton and Grossman (1986) subsequently showed that if firms compete instead in prices, then optimal policy will be to tax exports.

[13]The remaining comparative static results are $dp^t/dc^t > 0$, $dp^t/dc^{t'} > 0$, $dp^t/dc^2 > 0$, $dp^t/dp^f > 0$, $dp^t/d\eta^* < 0$, $dp^2/dc^t > 0$, $dp^t dc^2 > 0$, $dp^2/dp^f > 0$, $dp^2/d\eta^* < 0$, $dE\pi^2/dp^f > 0$ and $dE\pi^2/d\eta^* < 0$.

profits from supporting the petition are

$$\pi^L = \gamma^L[p^L(1,\bar{p}) - c^L]q^1(p^L(1,\bar{p}), p^2(1,\bar{p}), \bar{p})$$
$$+ (1 - \gamma^L)[p^L(1,\underline{p}) - c^L]q^1(p^L(1,\underline{p}), p^2(1,\underline{p}), \underline{p}) \quad (37)$$

In equilibrium these must be at least as large as its deviation profits from opposing the petition

$$\pi^L = [p^L(0,\underline{p}) - c^L]q^1(p^L(0,\underline{p}), p^2(0,\underline{p}), \underline{p}) \quad (38)$$

Notice, that in order to support this, γ^L and $\bar{p}$ must be sufficiently large! In particular, since $\gamma^L < \gamma^H$, a signaling equilibrium is difficult to support when firms compete in prices. Unfortunately, it is impossible to draw stronger conclusions and in fact, using linear demand functions, equilibrium profits are quadratic in output and thus convex. Therefore, a remedial duty benefits low cost firms more than high cost firms and if the difference is sufficient, a signaling equilibrium could exist.

The second case is far simpler. Suppose that it is an equilibrium. In this case, if firm 1 supports the petition, the firm 2 believes with probability 1 that firm 1 is of type H. But now a firm of type L can deviate by supporting the petition and be thought to be of type H with probability 1 and, in the event of a successful investigation, gain the benefits of an anti-dumping duty. That is, type L firms are unambiguously better off deviating by supporting the petition.

Thus the case of Bertrand competition, one would typically expect to observe pooling equilibria. As with the export subsidy literature, we get different results using Bertrand versus Cournot competition. However, the contrast is not as stark. Under Bertrand competition, it appears to be quite difficult to support a signaling equilibrium where type H firms oppose the dumping petition. As a result, one would typically expect pooling behavior. Under Cournot, both pooling and signaling are possible under plausible conditions. In other words, if a domestic producer, who does not have significant exports to or imports from the competing foreign countries involved, is observed opposing a dumping petition, a plausible explanation for this seemingly puzzling behavior is that the firm is in some sense in a "strong" position and that it wishes to credibly convey this information to its competitors.

VII   Conclusion

Firms in imperfectly competitive markets have an interest in signaling that they have a low cost structure so that they can increase market share and profits. But, of course, talk is cheap and so firms must be able to credibly demonstrate their competitiveness. If the firms are in an import-competing

industry in which domestic competitors have filed a petition for protection from imports, not supporting the injury investigation sends the signal that no protection is needed. Given the GATT rules on injury determination, this behavior will lower the probability of finding injury and so reduce the chances of tariff protection. At the same time, such a firm sends a credible signal that it is a low cost firm. Furthermore, because there may be unobservable communication prior to the decision to file, such signaling may be quite prevalent even if opposition to AD petitions were readily observable and rare.

While we have not systematically examined the extent of this behavior, we do at least have anecdotal evidence that seems suggestive. Beyond this, though, the model demonstrates yet another context in which laws which aim to regulate trade can have economic consequences even when they appear not to bind. For example, a negative finding in an anti-dumping case may appear to leave the competitive environment unaltered. But, as we have demonstrated, the investigation itself can provide the mechanism by which firms send credible signals to the competition and change the competitive outcomes.

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