Lobbying in Antidumping*

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Abstract

We analyze the interaction between a domestic firm and an international trade agency in charge of administering an antidumping procedure by means of a model in which dumping is viewed as an "aggressive" behavior of foreign firms against domestic firms of a relatively low-efficiency type. An informed and benevolent agency grants protection exclusively to this type of domestic firms. We introduce asymmetric information about the domestic firm's efficiency and let the agency's decision be influenced by the firm's choices of output and lobbying contribution. We characterize (pure-strategy) equilibria the properties of which shed some light on the way politics and economics interplay in antidumping, and perform a comparative statics analysis that highlights some of the benefits of reforming antidumping laws.

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1 Introduction

A paradox that has characterized international trade ever since the General Agreement on Tariffs and Trade (GATT) was created to encourage world trade liberalization, is the widespread use by countries of instruments that turn out to be significant impediments to free trade. Chief among those instruments are the antidumping codes that allow GATT signatories to counter dumping by levying import duties. In fact, work that has examined the functioning of antidumping procedures in various parts of the world (Boltuck and Litan, 1991) as well as efforts to measure the welfare impact of antidumping actions (Gallaway et al., 1999) suggest that antidumping might probably be "...the most costly form of protection" (Blonigen and Prusa, 2001).

The use of antidumping (AD) has grown at an impressive path throughout the world. For instance, over the last two decades, it has more than doubled both in the Unites States and the European Union. Meanwhile, many countries including South-Africa, Brazil, and Mexico have emerged as new intensive users of AD next to more traditional users such as Australia, Canada, the EU, New-Zealand, and the US. One reading of these trends suggests that AD has come to supersede more traditional trade barriers that countries use to protect their national economies, and hence, according to this view, antidumping is nothing else than "protectionism in disguise."

An alternative view has emphasized the notion of "antidumping privatization" reflecting the fact that private firms may use the AD procedure for their own interest (Hindley and Messerlin, 1996). A growing literature has in-

deed analyzed the way antidumping procedures affect the strategic behavior of firms and the agencies that administer these procedures. In its major part however, this literature has focused on the strategic interaction between the domestic and foreign firms, hence, among other things, providing a theory of how firms reach an agreement (often in quantity) before the final decision of the regulatory agency (see, e.g., Prusa, 1992 and Zanardi, 2000). One strand of this literature has explicitly taken into account the information incompleteness inherent to the antidumping process by introducing the possibility that firms (Kolev and Prusa, 2002) or the agency (Rosendorff, 1996) use an economic-variable signal to influence the outcome of the process which takes the form of a *voluntary export restraint* (VER) or an AD duty.[1]

On a more empirical front, a strand of this "strategic" AD literature has stressed the political economy aspect of antidumping. Following the work of Finger et al. (1982) and drawing on the theories of capture and congressional dominance, Gasmi et al. (1996) and Hansen and Prusa (1996) find that interest groups' political campaign (PAC) contributions are a significant factor in explaining the decision of the International Trade Commission to protect domestic industries. The main message that comes out of this empirical literature is that both economic and political factors are needed to explain AD outcomes. The analysis conducted in this paper sheds some light on the way these factors interact.

The role of interest groups in the shaping of public policy has attracted the interest of economists and political scientists for so long. For our purpose,

[1]More generally, a series of papers have stressed the role of incomplete information in international trade (see, e.g., Brainard and Martimort, 1997 and Wright, 1998).

we need to mention Anderson (1994) and Moore and Suranovic (1992) who examine lobbying in antidumping under a framework that abstracts from information problems. Accounting for information incompleteness, Rosendorff (1996) introduces the role of domestic politics in the choice of antidumping versus VER policies, but the influence of firms is not endogenized. Closer to our approach, although not concerned with antidumping, Ball (1995) analyzes monetary lobbying under asymmetric information. Along these lines, Bennedsen and Feldman (2003) introduce information search as an additional instrument of political influence. In this paper, we assume that the domestic firm uses lobbying as a monetary instrument of direct influence of the AD decision in addition to using an economic signal for obtaining a favorable decision. Our modeling framework therefore allows us to uncover some important aspects of the interaction between economic and political factors in antidumping.

The paper is organized as follows. The next section presents the basic theoretical ingredients that we put together to model what we consider as being the fundamental objective of antidumping laws, namely, to protect domestic firms that are found to be subject to aggressive behavior of a predatory nature from the part of foreign firms.[2] Such domestic firms are assumed to have some cost "weakness" that makes them vulnerable to foreign firms' impulses indeed. The agency in charge of antidumping makes its decision of whether

[2]Hence, we go beyond the definition of dumping as international price discrimination. Let us note that our interpretation is reasonably consistent with the "unfair trade" provisions of the GATT. However, we are aware of the fact that the issue of the definition of predatory behavior is itself not settled. In this paper, dumping is viewed as "aggressive" behavior which, for all purposes, is assimilated to predatory behavior. For a discussion of predatory dumping, see Hartigan (1996).

or not to intervene on the basis of the domestic firm's efficiency level. The benchmark case in which this level is common knowledge is discussed in this section.

In section 3, we assume that the firm's efficiency parameter is private information and that the agency infers it from observing the firm's output. Strategic signaling then takes place and we characterize equilibrium outcomes of this game representing the firm-agency relationship. We then introduce lobbying by the domestic firm as a monetary instrument of direct influence, taking into account the informational externality it has on the agency's beliefs about the firm's level of efficiency. We characterize equilibrium outcomes of this extended model of the firm-agency interaction first under complete information (section 4) and asymmetric information (section 5). In section 6, we performs some comparative statics analysis that turn out to be informative on the role of legislation reforms in antidumping. We conclude the paper by summarizing our results and giving some directions for future research. Technical proofs are given in the appendix.

2 The basic theoretical setting

We consider a national market in which a domestic firm faces potential aggressive (predatory) behavior by a foreign firm but may seek protection from an international trade agency. Within this basic setting, various strategic aspects involving the firms and the agency can be studied. This paper is concerned with the interaction between the domestic firm and the agency. More specifically, we examine the process of protection granting by the agency and

analyze some of the strategies through which the domestic firm can influence this process. In order to focus on the domestic firm-agency relationship (and for tractability), we assume a simple formal representation of the foreign firm's decision to be aggressive in the domestic market.

The domestic firm is of one of two types. Let $\theta \in \{\underline{\theta}, \overline{\theta}\}$, $\underline{\theta} < \overline{\theta}$, be a one-dimensional parameter that designates the type of this firm. Within our framework, it is useful to think of this parameter as representing the domestic firm's marginal cost. A $\overline{\theta}$-type firm is of a relatively low efficiency (high marginal cost) and is thus vulnerable to predatory behavior from the part of the foreign firm. In contrast, a $\underline{\theta}$-type firm is of a relatively higher efficiency (lower marginal cost) and is thus less likely to face predatory behavior.[3] We assume that the foreign firm effectively preys on the domestic firm only if the latter is of a low efficiency type, i.e., of type $\overline{\theta}$.

We assume that the main objective of the agency is to counter the economic effect of the foreign firm's aggressive behavior, if any, by levying an antidumping duty on the imported good. More formally, let the binary variable $d \in \{\underline{d}, \overline{d}\}$ represent the decision of the agency on a given case, with $d = \overline{d}$ if the agency decides to levy an AD duty on the foreign firm's good and $d = \underline{d}$ otherwise. Given the objective of the agency and our assumption about the adoption of predatory behavior by the foreign firm, a socially

[3]To be sure, for the domestic firm not to be subject to predatory behavior from the part of the foreign firm it suffices to assume that the efficiency levels of the two firms are close. Hence, $\underline{\theta}$ might be taken as a level of marginal cost of approximately the same magnitude as that of the foreign firm.

desirable outcome would then be

$$d = \begin{cases} \overline{d} & \text{if} \quad \theta = \overline{\theta} \\ \underline{d} & \text{if} \quad \theta = \underline{\theta} \end{cases} \tag{1}$$

We see at least two factors that might prevent this ideal situation from occurring. First, available information on the existence of predatory behavior is inherently incomplete and hence the agency might make both Type I and Type II errors. Second, in the domestic firm-agency relationship, private incentives might not coincide with social incentives leading to outcomes that are distorted away from this ideal outcome. We incorporate both of these factors into the basic model and analyze the (equilibrium) behavior of the domestic firm and the agency. We introduce asymmetric information first under the assumption that the agency is benevolent, and then we allow for the possibility that the agency's decision be influenced by the domestic firm through monetary transfers.

3 Benevolent antidumping under asymmetric information

Let us assume that the interaction between the domestic firm and the agency is described by a game the timing of which is shown in Figure 1 below and discuss the payoff structure of such a game. For a given agency decision-firm type couple $(d;\theta)$, we let $U(d;\theta)$ designate the *ex post* utility of the agency which is defined for $(d;\theta) \in \{(\underline{d};\underline{\theta}), (\overline{d};\overline{\theta}), (\underline{d};\overline{\theta}), \overline{d};\underline{\theta})\}$ by

$$U(d;\theta) = \begin{cases} \overline{U} & \text{if} \quad (d;\theta) \in \{(\underline{d};\underline{\theta}), (\overline{d};\overline{\theta})\} \\ \underline{U} & \text{if} \quad (d;\theta) \in \{(\underline{d};\overline{\theta}), (\overline{d};\underline{\theta})\} \end{cases} \tag{2}$$

where $\underline{U} < \overline{U}$. This specification of the agency's utility function is consistent with the preferences of a benevolent agency as reflected in the socially desirable outcome that we described in the previous section. Indeed, it shows that when it makes the "right" decision, namely, when it only protects a vulnerable domestic firm, the agency achieves the higher level of utility $\overline{U}$.

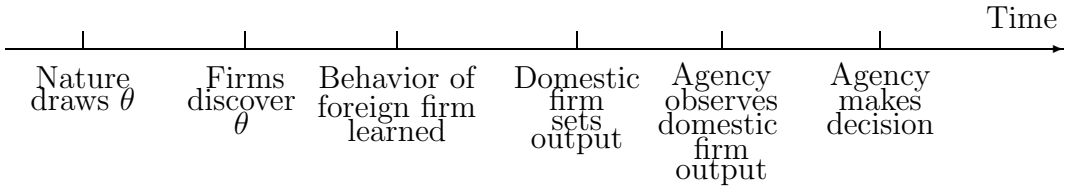

Figure 1: Timing of events with a benevolent agency

Upstream firms' interaction takes place in an economic variable that hereafter is taken to be output.[4] The output level chosen by the domestic firm, q, is observed by the agency prior to making its decision d. Let $w(q, d; \theta)$ represent the *ex post* payoff of the domestic firm at the end of the game and assume that this payoff is composed of two per-period payoffs. More specifically, ignoring discounting, this aggregate payoff is

$$w(q, d; \theta) = u(q; \theta) + v(d; \theta) \tag{3}$$

The domestic firm's first-stage payoff $u(q; \theta)$ may correspond to the profit it makes in the output game against the foreign firm. The second-stage payoff $v(d; \theta)$ may be viewed as a reduced form of the profit it makes in the period that just follows the agency's decision.[5] Note that since the value of

[4]Alternatively, this variable could represent labor which would be more appropriate in the case of Europe. As already indicated, for the purpose of this paper, we do not need to incorporate an explicit model of the firms' strategic interaction in our theoretical framework.

[5]Below, we give an explicite definition of this function v.

θ unambiguously determines the foreign firm's output level, there is no need to use the latter as an argument in the domestic firm's payoff functions.

For the purpose of this paper, let us assume that the domestic firm chooses output $q \in \{\underline{q}, \overline{q}\}$, with $\underline{q} < \overline{q}$, and that the low (high) output maximizes the low- (high-) efficiency firm's first-period payoff:[6]

$$u(\underline{q}; \overline{\theta}) > u(\overline{q}; \overline{\theta}) \tag{4}$$

$$u(\overline{q}; \underline{\theta}) > u(\underline{q}; \underline{\theta}) \tag{5}$$

The domestic firm's second-stage payoff function is assumed to take on the following values:

$$v(d;\theta) = \begin{cases} u(\overline{q};\underline{\theta}) & \text{if} \quad (d;\theta) \in \{(\overline{d};\overline{\theta}), (\underline{d};\underline{\theta})\} \\ u(\overline{q};\underline{\theta}) + \omega & \text{if} \quad (d;\theta) = (\overline{d};\underline{\theta}) \\ u(\underline{q},\overline{\theta}) & \text{if} \quad (d;\theta) = (\underline{d};\overline{\theta}) \end{cases} \tag{6}$$

where $\omega > 0$. Let us say a few words on this component payoff function's defining properties.

First, an efficient firm $\underline{\theta}$ that receives a (negative) decision $\underline{d}$ from the agency gets a payoff $v(\underline{d};\underline{\theta})$ which is assumed to be the "normal" level that a domestic firm not subject to predatory behavior would achieve in the quantity game, namely, $u(\overline{q};\underline{\theta})$. Second, assuming that the AD duty just compensates for the adverse effect of predatory behavior, an inefficient firm $\overline{\theta}$ that receives a (positive) decision $\overline{d}$ gets a payoff $v(\overline{d};\overline{\theta})$ equal to that of an efficient firm that receives a negative decision, i.e., $v(\underline{d};\underline{\theta})$. Third, when the agency makes

[6] In a framework where the firm's output choice set is continuous, the higher output level $\overline{q}$ may be interpreted as the equilibrium output of the domestic firm in a standard quantity game, while the lower output level $\underline{q}$ may be seen as its equilibrium output in a game where the foreign moves first in an aggressive manner.

the wrong decision of imposing a duty in a case involving an efficient firm $\underline{\theta}$, this firm enjoys a rent ω on the top of the normal level $v(\underline{d};\underline{\theta})$ it should get. Finally, when the agency makes the wrong decision of not imposing a duty in a case involving an inefficient firm $\overline{\theta}$, the firm obtains the level of payoff $u(\underline{q};\overline{\theta})$.

Given the values taken by the respective component payoff functions u and v described above, it is straightforward to derive those of the aggregate payoff function of the domestic firm w as

$$w(q,d;\theta)=\begin{cases}2u(\overline{q};\underline{\theta})+\omega & \text{if} \quad (q,d;\theta)=(\overline{q},\overline{d};\underline{\theta})\\ u(\underline{q};\underline{\theta})+u(\overline{q};\underline{\theta})+\omega & \text{if} \quad (q,d;\theta)=(\underline{q},\overline{d};\underline{\theta})\\ 2u(\overline{q};\underline{\theta}) & \text{if} \quad (q,d;\theta)=(\overline{q},\underline{d};\underline{\theta})\\ u(\underline{q};\underline{\theta})+u(\overline{q};\underline{\theta}) & \text{if} \quad (q,d;\theta)=(\underline{q},\underline{d};\underline{\theta})\\ u(\overline{q};\overline{\theta})+u(\overline{q};\underline{\theta}) & \text{if} \quad (q,d;\theta)=(\overline{q},\overline{d};\overline{\theta})\\ u(\underline{q};\overline{\theta})+u(\overline{q};\underline{\theta}) & \text{if} \quad (q,d;\theta)=(\underline{q},\overline{d};\overline{\theta})\\ u(\overline{q};\overline{\theta})+u(\underline{q};\overline{\theta}) & \text{if} \quad (q,d;\theta)=(\overline{q},\underline{d};\overline{\theta})\\ 2u(\underline{q};\overline{\theta}) & \text{if} \quad (q,d;\theta)=(\underline{q},\underline{d};\overline{\theta})\end{cases} \tag{7}$$

The payoffs of the agency and the domestic firm having been described, we now need to specify the information structure of the game shown in Figure 1 in order to solve for equilibrium.[7] Under complete information, i.e., if the agency knows the domestic firm's type, then the socially desirable outcome in which the domestic firm behaves truthfully and the agency makes the right decision can be achieved. This subgame-perfect equilibrium says: if $\theta=\overline{\theta}$, then $q^*(\overline{\theta})=\underline{q}$ and $d^*(\underline{q})=\overline{d}$, and if $\theta=\underline{\theta}$, then $q^*(\underline{\theta})=\overline{q}$ and $d^*(\overline{q})=\underline{d}$.[8]

[7] In this paper, we restrict attention to equilibria in pure strategies.

[8] Throughout, we use the symbol "*" to designate state of equilibrium. Note here that, since the agency observes θ, it can base its decision equivalently on the observation of θ or that of the firm's output.

Suppose now that θ is private information to the firm and that the agency holds prior beliefs on it defined by $\Pr(\theta = \underline{\theta}) = p$ and $\Pr(\theta = \overline{\theta}) = 1 - p$. Given that the agency observes the firm's output level prior to making its decision, it can infer the firm's type from this observation. Clearly then, the domestic firm may use output as a (strategic) signal of its type. Hence, the analysis of the firm-agency relationship as modeled so far can be cast within a framework of a signaling game. Figure 2 exhibits the extensive form of this game.[9]

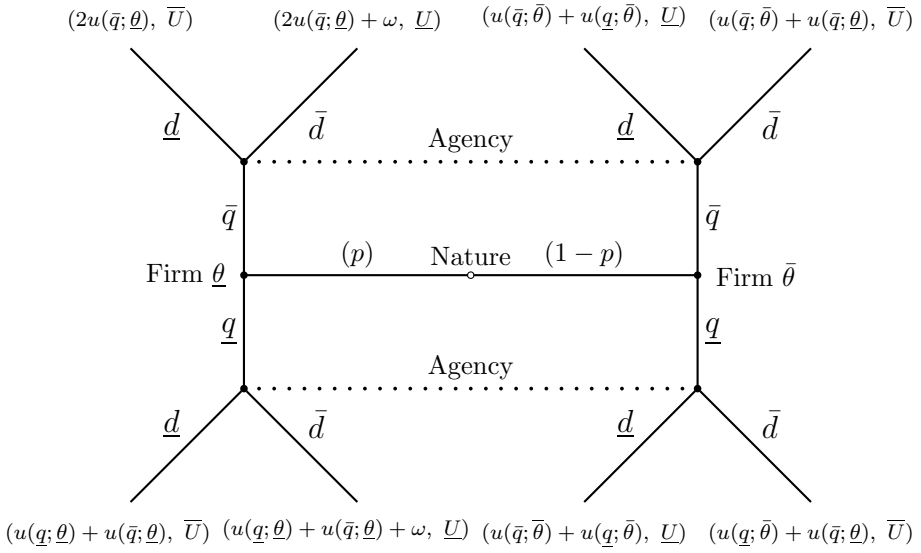

Figure 2: Extensive form of a signaling game with a benevolent agency

Following standard practices (see, e.g., Fudenberg and Tirole, 1991), we adopt the concept of perfect Bayesian equilibrium (PBE) and consider two types of equilibria. Equilibrium behavior might prescribe a different level of output for each of the two firm types in which case the equilibrium is

[9] As is clear from the payoff structure of this game, the output message is costly for the domestic firm and hence is a credible message, and a signal indeed.

qualified as "separating." Alternatively, a "pooling" equilibrium outcome might occur in which both types choose the same level of output. Let $\mu(\theta|q)$ represent the posterior belief function. PBE pure strategies for this game consist of a pair of firm output and agency decision functions $q^*(\cdot)$ and $d^*(\cdot)$ defined, respectively, from $\{\underline{\theta}, \overline{\theta}\}$ to $\{\underline{q}, \overline{q}\}$ and from $\{\underline{q}, \overline{q}\}$ to $\{\underline{d}, \overline{d}\}$, with the associated posterior beliefs $\mu(\cdot|\cdot)$ satisfying:

$$q^*(\cdot) \in \text{argmax}_q \; w(q, d^*(\cdot); \theta) \quad \text{for } \theta \in \{\underline{\theta}, \overline{\theta}\} \tag{8}$$

$$d^*(\cdot) \in \text{argmax}_d \sum_{\theta \in \{\underline{\theta}, \overline{\theta}\}} \mu(\theta|q) U(d; \theta) \tag{9}$$

$$\forall q, \text{ if } \exists \theta \text{ s.t. } q^*(\theta) = q, \text{ then } \mu(\theta|q) = \frac{\Pr(\theta)}{\sum_{\{\theta': q^*(\theta') = q\}} \Pr(\theta')} \tag{10}$$

The first two conditions merely require sequential rationality of both the firm and the agency. The third one says that, whenever possible, the agency revises its prior beliefs according to Bayes' rule.[10]

As is common in such games, since off-equilibrium path beliefs are unrestricted, equilibria might emerge that are counter intuitive. To rule out incredible strategies and beliefs as equilibria, we impose consistency of believes that are on off-equilibrium paths by using the familiar *intuitive criterion* proposed by Cho and Kreps (1987).[11] The following proposition characterizes the intuitive PBE pure strategies of the game.

[10]The caution "whenever possible" in fact means that this condition can only be applied to information sets on an equilibrium path. Note that the only free variables are off-equilibrium path beliefs and are completely arbitrary.

[11]The intuitive refinement criterion requires first to introduce the notion of an *equilibrium-dominated* message (see Gibbons, 1992). In our context, given a perfect Bayesian equilibrium, we will say that the message q is equilibrium-dominated for firm of type θ if θ's equilibrium payoff, denoted $w^*(\theta)$, is greater than θ's highest possible payoff from message q, i.e., $w^*(\theta) > \max_d w(q, d; \theta)$. The intuitive criterion says then that if the information set following the message q is off the equilibrium path and q is

Proposition 1. *For the signaling game that describes the domestic firm-agency relationship with a benevolent agency, intuitive PBE pure strategies are as follows:*

- *Separating:* $q^*(\overline{\theta}) = \underline{q}$, $q^*(\underline{\theta}) = \overline{q}$, $d^*(\underline{q}) = \overline{d}$, $d^*(\overline{q}) = \underline{d}$, *with beliefs* $\mu(\overline{\theta}|\underline{q}) = \mu(\underline{\theta}|\overline{q}) = 1$, *if and only if* $\Delta(\underline{\theta}) \geq \omega$, *where* $\Delta(\underline{\theta}) \equiv u(\overline{q}; \underline{\theta}) - u(\underline{q}; \underline{\theta})$.

- *Pooling:* $q^*(\overline{\theta}) = q^*(\underline{\theta}) = \underline{q}$, $d^*(\underline{q}) = \overline{d}$, *with beliefs* $\mu(\underline{\theta}|\overline{q}) = 1$, *if and only if* $\Delta(\underline{\theta}) < \omega$ *and* $p \leq 1/2$.

Proposition 1 shows how a high-efficiency domestic firm can manipulate information to its advantage. Examine the behavior of such a firm $\underline{\theta}$ across the two equilibria. This firm weighs the cost of (output-) imitating the less efficient firm ($\Delta(\underline{\theta})$) against the rent from getting protected by an antidumping duty (ω). In the separating equilibrium, the imitation cost is high relative to the rent and the firm decides to behave truthfully. In the pooling equilibrium, the imitation cost is relatively low and the firm chooses to misrepresent its type by sending a noisy output signal $\underline{q}$. However, since granting protection to an efficient firm is costly for the agency, the imitation cost is only be part of the story. In fact, pooling "blurs the picture" for the agency and forces it to rely on *a priori* information to make its decision. In this case, since the agency believes that the domestic firm is likely to be of a low-efficiency type ($p \equiv \Pr(\underline{\theta}) \leq 1/2$), it decides to protect it.

equilibrium-dominated for type θ, then the agency's posterior belief $\mu(\theta|q)$ must be zero, that is,

$$\mu(\theta|q) = 0 \quad \text{if} \quad w^*(\theta) > \max_d w(q, d; \theta)$$

whenever the level of production q is not equilibrium-dominated for both types.

While Proposition 1 offers some useful equilibrium existence results, its implications show some of the limits of this simple model. In particular, we see that no pure-strategy pooling equilibrium exists if the agency has relatively strong prior beliefs that the firm is efficient ($p > 1/2$).[12] If, in addition, the efficient firm's imitation cost is less than the rent ($\Delta(\underline{\theta}) < \omega$), then an equilibrium in pure strategies simply fails to exist. One way to circumvent this problem is to enlarge the strategy space of the firm.[13] In view of the large institutional/empirical and theoretical literature on political influence in international trade policy (see, e.g., Grossman and Helpman, 1994 and Hansen and Prusa, 1996), it makes sense for us to explore the effect of incorporating lobbying as an additional firm's strategic tool into our framework. Extending our basic model in this direction allows us to explore the relationship between economic and political factors in antidumping.

4 Lobbying in antidumping– the complete information benchmark

Building on the model presented in the previous section, we now introduce lobbying and write the agency's payoff as

$$V(l, d; \theta) \equiv U(d; \theta) + \alpha l \tag{11}$$

where $l \geq 0$ represents a monetary lobbying contribution by the domestic firm, $\alpha \leq 1$ is the agency's marginal value of lobbying, and U is the agency's

[12] In fact, it can be argued that it should generally be the case that $p > 1/2$.

[13] Beyond the fact that, as mentioned, we restrain our investigation of equilibrium to pure-strategy equilibria, our approach can also be justified on the ground of our objective to explore the political economy of antidumping.

utility defined in (2).[14] The domestic firm's payoff is given by

$$\pi(q, l, d; \theta) \equiv w(q, d; \theta) - l \tag{12}$$

where the function w is as defined in (7).

Figure 3 shows the timing of events of this extended game that now includes a lobbying episode. After the output decision and its observation by the agency, the domestic firm announces a level of monetary lobbying contribution in return to protection and then the agency makes its antidumping policy decision.[15] The underlying assumption here is that the output decision is made prior to the processing of an AD case whereas lobbying takes place once the case has brought before the agency.

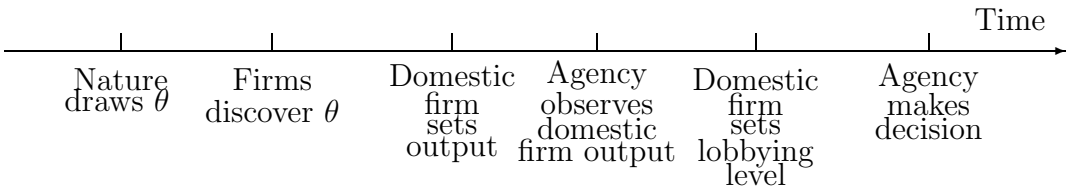

Figure 3: Timing of events with lobbying

Consider the benchmark case in which the agency knows the domestic firm's type. We then define subgame-perfect equilibrium pure strategies for this game as a triple of firm output, firm lobbying contribution, and agency decision functions $q^*(\cdot)$, $l^*(\cdot)$, and $d^*(\cdot)$ defined, respectively, from $\{\underline{\theta}, \overline{\theta}\}$ to

[14] Taking $\alpha \leq 1$ allows for both transferable utility ($\alpha = 1$) and transfer losses ($\alpha < 1$). This specification follows the standard literature on lobbying (see, e.g., Grossman and Helpman, 2002).

[15] We assume that the firm commits to its announce and, without loss of generality, we set the lobbying contribution announce contingent to an agency's negative decision to zero.

$\{\underline{q}, \overline{q}\}$, from $\{\underline{\theta}, \overline{\theta}\}$ to $\mathbb{R}_+$, and from $\{\underline{q}, \overline{q}\} \times \mathbb{R}_+$ to $\{\underline{d}, \overline{d}\}$ such that:

$$q^*(\cdot) \in \text{argmax}_q \ \pi(q, l^*, d^*(\cdot); \theta) \quad \text{for } \theta \in \{\underline{\theta}, \overline{\theta}\} \tag{13}$$

$$l^*(\cdot) \in \text{argmax}_l \ \pi(q, l, d^*(\cdot); \theta) \quad \text{for } \theta \in \{\underline{\theta}, \overline{\theta}\} \tag{14}$$

$$d^*(\cdot) \in \text{argmax}_d \ V(l, d; \theta) \tag{15}$$

The next proposition characterizes the equilibrium of this sequential game of complete information.

Proposition 2. *The subgame-perfect equilibrium of the game with lobbying between the domestic firm and the agency has the following form:*

- *If* $\theta = \overline{\theta}$*, then* $q^*(\overline{\theta}) = \underline{q}$*,* $l^*(\overline{\theta}) = 0$*, and* $d^*(\underline{q}, 0) = \overline{d}$*.*
- *If* $\theta = \underline{\theta}$*, then* $q^*(\underline{\theta}) = \overline{q}$*,* $l^*(\underline{\theta}) = l^{ci} \equiv (\overline{U} - \underline{U})/\alpha$*, and* $d^*(\overline{q}, l^{ci}) = \overline{d}$*, if and only if* $l^{ci} \leq \omega$*.*

As expected, under complete information, a low-efficiency firm ($\overline{\theta}$) need not make a lobbying transfer in order to obtain protection from the agency. In contrast, a high-efficiency firm ($\underline{\theta}$) has an incentive to lobby since lobbying is the only channel through which it can hope to gain protection. This firm will engage in lobbying and the agency will indeed grant protection, and both won't have a unilateral incentive te deviate, if the firm makes the minimal amount of transfer that will return a positive decision from the agency. Clearly, such a minimal level of successful lobbying under complete information, l^{ci}, solves $V(l^{ci}, \overline{d}; \underline{\theta}) - V(0, \underline{d}; \underline{\theta}) = 0$, where V is as defined in (11), and hence is given by $(\overline{U} - \underline{U})/\alpha$ as stated in the proposition. Note that the higher the agency's marginal value of lobbying α, the lower this minimal

level of lobbying contributions that would induce protection of the efficient firm under complete information.

5 Lobbying in antidumping under asymmetric information

With lobbying incorporated into the model, we now return to the case where the agency does not observe the firm's type but holds prior beliefs given by p, the probability that the domestic firm is cost efficient, i.e., of type $\underline{\theta}$. Since lobbying takes place after, successively, the firm has chosen output and the agency has observed it (see Figure 3), we assume that the agency updates its beliefs twice: once after the firm's output decision and once after its lobbying decision. The important point here is that the choice of output conveys information that the agency can cross-examine with the information that the choice of lobbying later provides. This suggests that, from the firm's perspective, there is a strategic link between the choices of output and lobbying when it comes to shaping the agency's beliefs. We give a formal representation of this link.

Let $\mu(\theta|q)$ represent the *first posterior beliefs* of the agency, i.e., the beliefs updated on the basis of the firm's output choice q, and $\zeta(\theta|\mu(\cdot), l)$ refer to the *second posterior beliefs*, i.e., the beliefs updated on the basis of the firm's lobbying choice l and given the first posterior beliefs held by the agency. A peculiar feature of this structure of beliefs is that while first posterior beliefs are updated versions of prior beliefs, second posterior beliefs are updated versions of first posterior beliefs. Consequently, *Bayesian consistency*

requires:

$$\forall q, \text{ if } \exists \theta \text{ s.t. } q^*(\theta) = q, \text{ then } \mu(\theta|q) = \frac{\Pr(\theta)}{\sum_{\{\theta': q^*(\theta')=q\}} \Pr(\theta')} \tag{16}$$

and

$$\forall l, \text{ if } \exists \theta \text{ s.t. } l^*(\theta, q) = l, \text{ then } \zeta(\theta|\mu(\cdot), l) = \frac{\mu(\theta|q)}{\sum_{\{\theta': l^*(\theta', q)=l\}} \mu(\theta'|q)} \tag{17}$$

Consistency thus requires that the agency be able to perfectly update its beliefs if at least one of the choices (output or lobbying) made by the two types of firms are different. On the contrary, if both choices are similar for the two types, nothing can be inferred by the agency.

We now turn to the resolution of this signaling game with double updating of beliefs. We define PBE pure strategies as a triple of firm output, lobbying contribution, and agency decision functions $q^*(\cdot)$, $l^*(\cdot)$, and $d^*(\cdot)$ defined, respectively, from $\{\underline{\theta}, \overline{\theta}\}$ to $\{\underline{q}, \overline{q}\}$, from $\{\underline{\theta}, \overline{\theta}\} \times \{\underline{q}, \overline{q}\}$ to $\mathbb{R}_+$, and from $\{\underline{q}, \overline{q}\} \times \mathbb{R}_+$ to $\{\underline{d}, \overline{d}\}$ satisfying:

$$q^*(\cdot) \in \text{argmax}_q \ \pi(q, l^*, d^*(\cdot); \theta) \ \text{ for } \theta \in \{\underline{\theta}, \overline{\theta}\} \tag{18}$$

$$l^*(\cdot) \in \text{argmax}_l \ \pi(q, l, d^*(\cdot); \theta) \ \text{ for } \theta \in \{\underline{\theta}, \overline{\theta}\} \tag{19}$$

$$d^*(\cdot) \in \text{argmax}_d \sum_{\theta \in \{\underline{\theta}, \overline{\theta}\}} \zeta(\theta|\mu(\cdot|q), l) V(d, l; \theta) \tag{20}$$

with associated first and second posterior beliefs $\mu(\cdot|q)$ and $\zeta(\cdot|\mu, l)$ that, respectively, verify (16) and (17).

Given that first and second posterior beliefs are not restricted on off-equilibrium paths, we expect multiple equilibria to exist for this game with

an extended strategy space for the firm. In view of our findings in the previous sections, we choose to restrict our analysis to cases where the (truthful) separating output strategies with $q^*(\overline{\theta}) = \underline{q}$ and $q^*(\underline{\theta}) = \overline{q}$, and the (distorted) pooling strategies with $q^*(\overline{\theta}) = q^*(\underline{\theta}) = \underline{q}$ can be sustained as equilibrium strategies. Besides the fact that these output strategies have some intuitive appeal, recall that they were part of the equilibrium outcomes of the game without lobbying under both complete and incomplete information (see Proposition 1). A cross-analysis of the equilibrium conditions will then give us an idea of the extent to which the introduction of lobbying in the model affects the likelihood of these output strategies emerging in equilibrium.

When lobbying is feasible and under complete information (see Proposition 2), we saw that, since it cannot strategically use output, the only way for the efficient firm to gain protection is to invest in some minimal but positive amount of lobbying l^{ci}. As we will see below, this option with separating strategies is still a possibility under asymmetric information. Moreover, because the agency has inferior information on the firm's type, the efficient firm can also manage to obtain protection with less lobbying (if $p > 1/2$) and even with no lobbying at all (if $p \leq 1/2$) by misrepresenting its type.

Proposition 3. *With output and lobbying as instruments of influence, the separating output strategies $q^*(\overline{\theta}) = \underline{q}$ and $q^*(\underline{\theta}) = \overline{q}$ can be part of a PBE both with and without lobbying:*

- *Case with lobbying (if $l^{ci} \leq \min\{\Delta(\underline{\theta}), \omega\}$):*

  $q^*(\overline{\theta}) = \underline{q}$, $q^*(\underline{\theta}) = \overline{q}$, $l^*(\overline{\theta}, \underline{q}) = 0$, $l^*(\underline{\theta}, \overline{q}) = l^{ci}$, $d^*(\underline{q}, 0) = d^*(\overline{q}, l^{ci}) = \overline{d}$, *with beliefs* $\mu(\overline{\theta}|\underline{q}) = \mu(\underline{\theta}|\overline{q}) = 1$, $\zeta(\overline{\theta}|\mu(\overline{\theta}|q), 0) = \zeta(\underline{\theta}|\mu(\underline{\theta}|q), l^{ci}) = 1$.

- *Case without lobbying (if* $\omega < \min\{l^{ci}, \Delta(\underline{\theta})\}$*):*

  $q^*(\overline{\theta}) = \underline{q}$, $q^*(\underline{\theta}) = \overline{q}$, $l^*(\overline{\theta}, \underline{q}) = l^*(\underline{\theta}, \overline{q}) = 0$, $d^*(\underline{q}, 0) = \overline{d}$, $d^*(\overline{q}, 0) = \underline{d}$, *with beliefs* $\mu(\overline{\theta}|\underline{q}) = \mu(\underline{\theta}|\overline{q}) = 1$, $\zeta(\overline{\theta}|\mu(\overline{\theta}|q), 0) = \zeta(\underline{\theta}|\mu(\underline{\theta}|q), 0) = 1$.

By allowing for the possibility of lobbying, we see that optimal quantities can be chosen both in the case where the agency protects the two types of firms and in the case where only the less efficient firm receives a protection. We know from Proposition 1 that when lobbying is not a choice variable for the domestic firm, only the second possibility can happen in equilibrium. Now that lobbying is introduced, the domestic firm disposes of two instruments to maximize its payoff. Provided that the rent from getting protected is sufficiently high, it is the comparison between the output imitation cost, $\Delta(\underline{\theta})$, and the lobbying contribution cost, l^{ci}, that matters for the more efficient firm.

For this firm, when the rent from protection is low, the lobbying activity is not profitable and we are back to the separating case without protection encountered in Proposition 1. When the rent is high, lobbying becomes attractive and most importantly it alleviates the incentive constraint on the quantity choice. In Proposition 1, we saw that the condition for the existence of a separating equilibrium is that the rent ω be lower than the imitation cost $\Delta(\underline{\theta})$. With lobbying, we see that even if the rent is high, a separating equilibrium may exist since what needs only to be checked is that $l^{ci} \leq \Delta(\underline{\theta})$. Hence, in addition to allowing the firm to "buy" protection, the presence of lobbying takes out the rent from the incentive constraint on output choice, and hence relaxes it.

These two effects of lobbying taken together allow a separating equilibrium with protection of both types of firms to emerge. An important consequence of the introduction of lobbying is then to lessen the constraints needed for the existence of a separating equilibrium, making information revelation more likely. This result is consistent with the findings of the literature on monetary lobbying under incomplete information. For example, Ball (1995) shows that lobbying can be (social) welfare-enhancing when it is used as a signaling device to the extent that it conveys information that allow government to improve their policies. In our framework, this positive effect is reflected in the increase of the less efficient firm's welfare due to the fact that this firm gets protected with no lobbying cost whenever there is information revelation.

We just saw that the additional instrument (lobbying) allows the more efficient firm to obtain protection without the need to distort output. We however observe that the lobbying contribution that yields protection in the separating equilibrium is equal to the contribution that this firm would make under complete information (see Proposition 3) which can be high. This suggests that there exists a tradeoff between the cost of output distortion and that of lobbying as confirmed by the next proposition. Indeed, this proposition shows that the more efficient firm can reduce the lobbying contribution that will induce protection by distorting output.

Proposition 4. *With output and lobbying as instruments of influence, the pooling output strategies* $q^*(\overline{\theta}) = q^*(\underline{\theta}) = \underline{q}$ *can be part of a PBE both with*

and without lobbying, with associated posterior beliefs

$$\mu(\underline{\theta}|q) = \begin{cases} p & \text{if } q = \underline{q} \\ 1 & \text{if } q = \overline{q} \end{cases} \tag{21}$$

and

$$\zeta(\underline{\theta}|\mu(\cdot), l) = \begin{cases} \mu(\underline{\theta}|q) & \text{if } l \leq \tilde{l} \\ 1 & \text{if } l > \tilde{l} \end{cases} \tag{22}$$

where $\tilde{l}$ is the level of lobbying on which the two types pool. These PBE correspond to

- *Case with lobbying (if $p > 1/2$, $l^{ii} \equiv (\overline{U} - \underline{U})(2p-1)/\alpha) \leq \min\{u(\overline{q};\underline{\theta}) - u(\underline{q};\overline{\theta}), \omega\}$, and $\Delta(\underline{\theta}) + l^{ii} \leq \min\{l^{ci}, \omega\}$):*

  $q^*(\overline{\theta}) = q^*(\underline{\theta}) = \underline{q}$, $l^*(\overline{\theta}, \underline{q}) = l^*(\underline{\theta}, \underline{q}) = l^{ii}$, $d^*(\underline{q}, l^{ii}) = \overline{d}$, with beliefs given above and $\tilde{l} = l^{ii}$;

- *Case without lobbying (if $p \leq 1/2$, $\Delta(\underline{\theta}) \leq \min\{l^{ci}, \omega\}$):*

  $q^*(\overline{\theta}) = q^*(\underline{\theta}) = \underline{q}$, $l^*(\overline{\theta}, \underline{q}) = l^*(\underline{\theta}, \underline{q}) = 0$, and $d^*(\underline{q}, 0) = \overline{d}$, with beliefs given above and $\tilde{l} = 0$.

This proposition reveals an interesting effect. The existence of the pooling equilibrium (on $\underline{q}$) is no longer constrained by the value of the agency's prior on $\underline{\theta}$ while in Proposition 1 this prior had to be low. The possibility that the agency believes that a given firm is most likely to be of the more efficient type doesn't preclude pooling strategies since both types of firms can lobby to obtain protection as can be seen from the case with $p > 1/2$ of Proposition 4. But, there is a strong link between output and lobbying decisions. Pooling on the lower output level $\underline{q}$ is possible only if it is accompanied by pooling strategies on lobbying contributions. This is so because with two channels of

influence, keeping the agency uninformed might indeed be beneficial for the firm.

The critical player here is the more efficient firm. The reason why this firm may be interested in a pooling strategy is that, in this case, the uninformed agency cannot rule out the possibility that the firm is of the less efficient type. The main consequence of a pooling output strategy is then to alleviate the participation constraint of the agency at the lobbying-stage game, i.e., to reduce the amount of lobbying necessary to induce an agency's decision that is favorable to the more efficient firm.[16] Hence, the relevant comparison for this firm is that of the cost of pooling on output $\Delta(\underline{\theta})$, i.e., the cost of imitating the lower-efficient type, with the cost of deviating to a separating strategy that brings with it a lobbying cost l^{ci} that is greater than l^{ii}.

As noted above, this comparison makes sense only if the less efficient firm is willing to engage in lobbying which, as can easily be checked, is true if $l^{ii} \leq u(\overline{q};\underline{\theta}) - u(\underline{q};\overline{\theta})$. Indeed, if there is lobbying separation, the agency becomes completely informed and this changes its participation constraint in the lobbying-stage game. A low output would then no longer be optimal for the more efficient firm since the cost of this output distortion would not be compensated by a lower lobbying contribution.

The interdependence between the two instruments (output and lobbying)

[16]This information cross-effect between the output and lobbying instruments is in the spirit of an effect discussed by Bennedsen and Feldmann (2003). They propose a model where interest groups influence political actors' decisions through the provision of verifiable information and lobbying contributions. They show that a lobby might find it worthwhile to abandon information provision because this might induce an information externality that leads to an increase of the lobbying cost.

makes the effect of lobbying more complex and an important consequence of this interdependence is that it can imply a bias towards pooling strategies.[17] Hence, the less efficient firm might be penalized since it gets a protection only if it lobbies as much as the more efficient firm, a feature of the pooling equilibrium to which we will return in the next section.

6 Role of antidumping legislation

A factor that has played an important role in much of the analysis so far is the imitation cost of the more efficient firm that, in our framework, reflects the direct loss in utility that this firm incurs when it chooses the level of output that the less efficient firm would normally supply. Ideally, such a cost should be endogenous to the rules of the antidumping procedure. While the relationship between the antidumping laws and the behavior of firms largely deserves a study by itself, even a fully-fledged model of how the antidumping legislation affects the cost of imitation is beyond the scope of this paper. However, one still can make assumptions on some important aspects of this relationship and perform comparative statics exercises.

Let us assume that an antidumping legislation can be characterized by a one-dimensional parameter $\Psi \in \left[\underline{\Psi}, \overline{\Psi}\right]$, $\underline{\Psi} < \overline{\Psi}$, that represents its more or less stringent nature and further assume that a legislation of type Ψ' is strictly more stringent than one of type Ψ'' if and only if $\Psi' > \Psi''$. This parameter Ψ may for example correspond to the level of marginal cost above which a

[17] If the economic signal (taken to be output in this paper) represents labor, an implication of this result is that an efficient firm would chose to reduce employment in order to decrease the lobbying contribution that would induce protection.

firm is a priori considered by the agency to be of a less efficient type $\overline{\theta}$ and hence potentially entitled to receive protection.[18] Under this interpretation, clearly a higher level of Ψ makes it, all things equal, harder for a firm to credibly pretend that it needs protection from the agency. Accordingly, it makes sense to assume that the more stringent the antidumping legislation, the higher the imitation cost, or more formally that $\Delta(\underline{\theta})$ is strictly increasing in Ψ.

Under this same interpretation of Ψ and assuming that the agency "estimates" its prior p from frequency data on a fixed-size sample of representative firms, one can further assume that, all things equal, the more stringent the legislation, the higher the probability that a given firm is a priori taken to be of the higher efficiency type $\underline{\theta}$ by the agency. The following result is then directly established from the expression of the level of lobbying necessary to induce protection in the pooling equilibrium, l^{ii} (see Proposition 4):[19]

Proposition 5. *As the antidumping legislation becomes more stringent, i.e., as Ψ increases, the (pooling) equilibrium level of lobbying that yields protection, l^{ii}, increases.*

From this proposition, one can infer that reforming antidumping laws so as to make them more severe has a double negative effect on the likely occurrence of the pooling equilibrium with lobbying. In fact, since both $\Delta(\theta)$ (as assumed) and l^{ii} (as stated in Proposition 5) are increasing in Ψ, such a reform would increase the likelihood of the conditions characterizing

[18] The closer Ψ is from its lower bound $\underline{\Psi}$, the more light-handed the intervention of the agency.

[19] A maintained assumption in this section is that the agency's prior is sufficiently large, more specifically, $p > 1/2$.

the pooling equilibrium with lobbying being violated (see Proposition 4). A more stringent procedure (a higher Ψ) increases the cost of the more efficient firm imitating the less efficient firm in output, and hence should make the former reluctant to implement output pooling. This is a direct effect of the reform via the firm's choice of output. Proposition 5 reveals yet an indirect effect of the reform via its positive impact on the agency's prior p that renders protection for the firm more costly in terms of lobbying when there is pooling in output.[20] It is worth noting that in the context of this pooling equilibrium, these implications provide a positive theory justification for why firms that lobby would oppose reforms of antidumping laws while agencies would favor such reforms.

Our previous discussion has highlighted two channels through which reforms of antidumping laws may affect the equilibrium outcome, through their effect on the firm's cost of shirking (direct effect) and through their effect on the agency's beliefs (indirect effect). More specifically, we found that if the conditions that yield the pooling equilibrium with lobbying are met (see Proposition 4 for these conditions), then making an antidumping legislation more stringent leads to higher cost of protection-inducing lobbying coupled with output distortion by efficient firms. This raises questions about the welfare consequences of this type of reforms that are worth exploring. To pave the way for such an analysis though, we should recognize that the pooling

[20]Following an increase in Ψ, a given firm is more likely to be considered of the more efficient type, and so it is *as if* the agency revised its prior belief p upward. Because pooling in output is not informative for the agency, the latter has an incentive to trade protection for a larger amount of lobbying money. Note that this effect on lobbying can be substantial as can be checked from the sensitivity to the prior p of the ratio of the lobbying under asymmetric information to that under complete information, l^{ii}/l^{ci} $(= 2p - 1)$.

equilibrium embodies the features that will possibly condamne it as an actual equilibrium outcome in a context of active antidumping reforms.[21]

Hence, for the the purpose of the next exercise we enlarge the set of possible equilibrium outcomes to include the other (and only the other) equilibria analyzed in the previous section. Let us denote the pooling equilibrium with lobbying P_l and, for simplicity of the analysis, assume that $p > 1/2$ so that only the two equilibria that were characterized in Proposition 3, namely, the separating equilibrium with lobbying, S_l, and the separating equilibrium without lobbying, S_{nl}, can be incorporated into the set of possible equilibria. For an antidumping legislation of a given type Ψ, let $\mathcal{E}(\Psi) \equiv \{\mathrm{P}_l(\Psi), \mathrm{S}_l(\Psi), \mathrm{S}_{nl}(\Psi)\}$ be the set of candidate equilibrium outcomes that can be sustained under this legislation. Let $\mathcal{I}_\Psi \subset \left[\underline{\Psi}, \overline{\Psi}\right]$ be the interval of antidumping legislation types over which at least one of the equilibria in $\mathcal{E}$ is sustainable, and let A_Ψ, $\Psi \in \mathcal{I}_\Psi$, designate the actual equilibrium which is sustainable under the legislation Ψ.[22,23]

Assume that the three feasible equilibrium types are ordered according to the level of "social welfare" achieved as $\mathrm{S}_{nl} \succeq_W \mathrm{S}_l \succeq_W \mathrm{P}_l$, where for any two equilibria E_1 and E_2, $E_1 \succeq_W E_2$ means that a move from E_2 to E_1

[21] Indeed, as Ψ gets higher, the firm faces increasing lobbying-costs of protection, and there clearly will be a level of Ψ above which separating behavior will substitute to pooling behavior.

[22] Given that mixed strategies are not taken into account in this paper, considering only P_l, S_l, and S_{nl} as the only possible equilibria clearly brings up the issue of equilibrium existence. We realize, indeed, that there is a small set of values of the exogenous parameter of the model Ψ over which no pure-strategy equilibrium exists.

[23] Outside the small interval mentioned in the previous footnote over which no pure-strategy equilibrium exists, it is easy to see from their characterization in Propositions 3 and 4 that, for a given Ψ, the three equilibrium types considered here are mutually exclusive.

weakly increases social welfare.[24] Given these social preferences over the set of feasible equilibrium outcomes, the next proposition basically says that, in an economy producing with a priori sufficiently efficient firms, a reform towards a harsher antidumping legislation is socially desirable:

Proposition 6. *Assume that the imitation cost $\Delta(\underline{\theta})$ is strictly increasing in Ψ and that the agency's prior p is sufficiently large ($p > 1/2$). Then, for any two antidumping legislation types Ψ_1, $\Psi_2 \in \mathcal{I}_\Psi$ such that $\Psi_1 < \Psi_2$, we have $A_{\Psi_2} \succeq_W A_{\Psi_1}$.*

This proposition takes further the inferences drawn from Proposition 5 about the benefits of an active reform that tightens an antidumping legislation. It says that such a reform can never lead to a move from a separating equilibrium to a pooling equilibrium. Moreover, for a reform that erects sufficiently high barriers to firms' output misrepresentation, through a higher marginal cost threshold, say, a move from the pooling equilibrium to the separating equilibrium leading to welfare enhancement is possible. Provided that the antidumping legislation is sufficiently stringent, the argument can even be further stretched. Indeed, any policy that pushes up the level of lobbying under complete information, l^{ci}, i.e., that renders the fulfilling of the agency's participation constraint more difficult, should be seen as highly beneficial since it gives the separating equilibrium without lobbying at all the highest likelihood of occurrence.[25]

[24] This ordering says then that the level of social welfare decreases when moving from an equilibrium of type S_{nl} to one of type S_l, and from an equilibrium of type S_l to one of type P_l. The underlying reason for this ordering lies in the "rent seeking" nature of lobbying under an equilibrium outcome of a S_l or a P_l type and the social cost that output distortion imposes under an equilibrium of type P_l.

[25] A policy that decreases the agency's marginal value of lobbying, α, would certainly

7 Conclusion

In a model of the domestic firm-agency interaction in antidumping, we have analyzed some implications of asymmetric information about the firm's efficiency on equilibrium behavior. When output only is used by the firm to signal its type to the agency, an incentive issue arises: separating strategies correspond to optimal quantity choices but induce that the firm of the more efficient type doesn't receive a protection. Hence, the domestic firm may face contradictory forces because the rent generated by protection gives it an incentive to adopt pooling strategies while the agency's lack of information implies that it grants protection to the firm only if it believes *a priori* that the firm is likely to be of the less efficient type. Hence, for the case where both the rent from protection and the prior on the efficient type are sufficiently high, this basic model leads to an impasse.

To circumvent this difficulty, we have introduced lobbying as an additional instrument that the firm can use to influence the antidumping outcome. The more efficient firm can now afford not to distort output and still get a protection by making a lobbying contribution. This firm's incentive constraint is alleviated since it does not face the tradeoff between rent from protection and cost of output distortion. Moreover, by inducing information revelation, separating strategies lead to protection at no lobbying cost for the less efficient firm.

The introduction of a second tool to influence the agency's decision high-

achieve such a result.

lights another effect which is due to the existence of asymmetric information. In our model, output and lobbying decisions occur sequentially so that the output chosen by the firm can possibly modify the agency's beliefs before lobbying takes place. A consequence of this structure of information transmission is that separating strategies on output make the agency completely informed. In order to reduce the lobbying contribution that induces protection, the more efficient firm may then prefer to pool on the output choice. Thus, introducing lobbying as an instrument of influence in addition to output tends to favor, *all things equal*, pooling as an equilibrium behavior, provided that the more efficient firm does not incur too high a cost when it goes on to imitate the less efficient firm in output.

The emergence of this pooling equilibrium outcome fundamentally rests on two assumptions. First, the imitation cost has to be relatively low. Second, the agency's prior, i.e., its belief that a given firm is not in need of protection, although allowed to be greater than one-half, has to be sufficiently remote from one.[26] In our framework, these characteristics taken together correspond to a loose antidumping legislation. A reform of the AD legislation that substantially increases the imitation cost turns out to increase the lobbying cost as well, and hence is likely to threaten the occurrence of this pooling equilibrium. Furthermore, in addition to making this equilibrium less probable, a reform that toughens an antidumping legislation makes separating behavior and information revelation most likely. The very benefit of this type of reforms lies in their ability to break the link between economic and

[26]Indeed, a too high prior would lead to a level of lobbying cost under incomplete information close to that under complete information.

political strategies that firms, thanks to information asymmetries inherent to antidumping, use to strengthen their market position through protection.

Further research is warranted. First, our model doesn't make the distinction between a direct lobbying assimilated to a collusion between the domestic firm and the agency and an indirect lobbying through the political institutions that oversee the agency. Second, although we mention some preferences of firms and agency over reforms of the antidumping legislation, there clearly is a need to introduce within the framework of our model a distinction between lobbying to implement existing laws favorably and lobbying to change the laws in a favorable manner. Disentangling these various aspects of lobbying would certainly enhance our understanding of the complex antidumping process. Third, while this paper has considered the impact of lobbying on the decision of the agency on a given case, it would also be instructive to investigate how it affects the other important outcome of the antidumping process, namely, the withdrawal of a case once a VER agreement has been reached. Last but not least, given the growth of antidumping cases and the availability of data on those cases, empirically testing some of the important implications of the analysis in this paper seems particularly promising.

Appendix

Proof of Proposition 1: We start by characterizing the best response of the agency when the posterior beliefs are given:[27]

Claim 1. *Given an output choice q by the domestic firm, $d^*(q) = \overline{d}$ if $\mu(\overline{\theta}|q) \geq 1/2$ and $d^*(q) = \underline{d}$ if $\mu(\underline{\theta}|q) < 1/2$.*

Proof. The result comes from the fact that the agency maximizes its payoff by choosing $\overline{d}$ if and only if $\mu(\underline{\theta}|q)\underline{U} + [1 - \mu(\underline{\theta}|q)]\,\overline{U} \geq \mu(\underline{\theta}|q)\overline{U} + [1 - \mu(\underline{\theta}|q)])\underline{U}$, that is, if and only if $\mu(\underline{\theta}|q) \leq 1/2$, i.e., $\mu(\overline{\theta}|q) \geq 1/2$. □

We now examine the four possible pure-strategy equilibrium candidates.

Claim 2. *The separating case with $q^*(\overline{\theta}) = \underline{q}$ and $q^*(\underline{\theta}) = \overline{q}$, $d^*(\underline{q}) = \overline{d}$ and $d^*(\overline{q}) = \underline{d}$, with beliefs $\mu(\underline{\theta}|\overline{q}) = 1$ and $\mu(\overline{\theta}|\underline{q}) = 1$, constitutes a PBE if and only if $\Delta(\underline{\theta}) \geq \omega$.*

Proof. Bayes' rule implies that $\mu(\underline{\theta}|\overline{q}) = 1$ and $\mu(\overline{\theta}|\underline{q}) = 1$ and the agency chooses $d^*(\underline{q}) = \overline{d}$ and $d^*(\overline{q}) = \underline{d}$ by Claim 1. The $\overline{\theta}$-type firm clearly has no incentive to deviate and the same is true for the $\underline{\theta}$-type if and only if $u(\overline{q}; \underline{\theta}) - u(\underline{q}; \underline{\theta}) \geq \omega$, i.e., $\Delta(\underline{\theta}) \geq \omega$. □

Claim 3. *The separating case with $q^*(\overline{\theta}) = \overline{q}$ and $q^*(\underline{\theta}) = \underline{q}$ is not a PBE.*

Proof. Bayes' rule implies that $\mu(\underline{\theta}|\underline{q}) = 1$ and $\mu(\overline{\theta}|\overline{q}) = 1$. Hence, $d^*(\underline{q}) = \underline{d}$ and $d^*(\overline{q}) = \overline{d}$ by Claim 1. Then, clearly, the firm of type $\underline{\theta}$ has an incentive to switch from $\underline{q}$ to $\overline{q}$. □

[27] We assume that the agency protects the firm when it is indifferent between protection and no protection.

Claim 4. *The pooling case with* $q^*(\underline{\theta}) = q^*(\overline{\theta}) = \underline{q}$*, and* $d^*(\underline{q}) = \overline{d}$*, with beliefs* $\mu(\underline{\theta}|\underline{q}) = p$*, constitutes a PBE if and only if* $p \leq 1/2$*,* $\omega < \Delta(\underline{\theta})$*, and* $\mu(\underline{\theta}|\overline{q}) > 1/2$*.*

Proof. Bayes' rule implies that $\mu(\underline{\theta}|\underline{q}) = p$. By Claim 1, the best response of the agency is $\overline{d}$ if and only if $p \leq 1/2$ and $\underline{d}$ otherwise. Now, consider the behavior of the firm and suppose first that $p > 1/2$. Then, since $d^*(\underline{q}) = \underline{d}$, the $\underline{\theta}$-firm should deviate as $2u(\overline{q};\underline{\theta}) > u(\underline{q};\underline{\theta}) + u(\overline{q};\underline{\theta})$ (see (5)). Thus, we require $p \leq 1/2$. If the off-equilibrium beliefs are such that $\mu(\underline{\theta}|\overline{q}) \leq 1/2$, then $d^*(\overline{q} = \overline{d}$ (by Claim 1) and this firm won't have an incentive to deviate iff $u(\underline{q};\underline{\theta}) + u(\overline{q};\underline{\theta}) + \omega > 2u(\overline{q};\underline{\theta}) + \omega$, a contradiction to (5). Now, assume then $\mu(\underline{\theta}|\overline{q}) > 1/2$. By Claim 1, $d^*(\overline{q} = \underline{d}$, and the $\underline{\theta}$-firm won't deviate iff $u(\underline{q};\underline{\theta}) + u(\overline{q};\underline{\theta}) + \omega > 2u(\overline{q};\underline{\theta})$, i.e., $\Delta(\underline{\theta}) < \omega$. Finally, concerning the $\overline{\theta}$-firm, when $p \leq 1/2$, $d^*(\underline{q}) = \overline{d}$ (by Claim 1) and (4) imply that a deviation from $\underline{q}$ to $\overline{q}$ is detrimental. □

Claim 5. *The pooling case with* $q^*(\underline{\theta}) = q^*(\overline{\theta}) = \overline{q}$*, and* $d^*(\overline{q}) = \overline{d}$*, with beliefs* $\mu(\underline{\theta}|\overline{q}) = p$*, constitutes a PBE if and only if* $p \leq 1/2$*,* $2u(\underline{q};\overline{\theta}) < u(\overline{q};\overline{\theta}) + u(\overline{q};\underline{\theta})$*, and* $\mu(\overline{\theta}|\underline{q}) < 1/2$*.*

Proof. Bayes' rule yields $\mu(\underline{\theta}|\overline{q}) = p$. The agency then sets $d^*(\overline{q}) = \overline{d}$ if and only if $p \leq 1/2$ and $d^*(\overline{q}) = \underline{d}$ otherwise. Assume first that $p > 1/2$. Since $d^*(\overline{q}) = \underline{d}$, the $\overline{\theta}$-firm clearly has an incentive to deviate since $u(\overline{q};\overline{\theta}) + u(\underline{q};\overline{\theta}) < 2u(\underline{q};\overline{\theta})$ (see (4)). Equilibrium behavior thus requires $p \leq 1/2$ which we assume. If $\mu(\overline{\theta}|\underline{q}) \geq 1/2$, then $d^*(\underline{q}) = \overline{d}$ by Claim 1, and this firm won't have an incentive to deviate iff $u(\overline{q};\overline{\theta}) + u(\overline{q};\underline{\theta}) > u(\underline{q};\overline{\theta}) + u(\overline{q};\underline{\theta})$, a contradiction to (4). Hence, assume that $\mu(\overline{\theta}|\underline{q}) < 1/2$, in which case, by

Claim 1, $d^*(\underline{q}) = \underline{d}$. Then the $\overline{\theta}$-firm won't deviate iff $2u(\underline{q};\overline{\theta}) < u(\overline{q};\overline{\theta}) + u(\overline{q};\underline{\theta})$. As to the $\underline{\theta}$-firm, when $p \leq 1/2$, $d^*(\underline{q}) = \overline{d}$ (by Claim 1) and (5) imply that a deviation from $\overline{q}$ to $\underline{q}$ is not beneficial. □

Claim 6. *Among the three PBE, only the following two satisfy the Intuitive Criterion:*

- *The separating case with $q^*(\overline{\theta}) = \underline{q}$ and $q^*(\underline{\theta}) = \overline{q}$, $d^*(\overline{\theta}) = \overline{d}$ and $d^*(\underline{\theta}) = \underline{d}$, with beliefs $\mu(\underline{\theta}|\overline{q}) = 1$ and $\mu(\overline{\theta}|\underline{q}) = 1$, constitutes an Intuitive PBE if and only if $\Delta(\underline{\theta}) \geq \omega$.*

- *The pooling case with $q^*(\underline{\theta}) = q^*(\overline{\theta}) = \underline{q}$, and $d^*(\underline{q}) = \overline{d}$, with beliefs $\mu(\underline{\theta}|\underline{q}) = p$, constitutes an Intuitive PBE if and only if $p \leq 1/2$, $\omega < \Delta(\underline{\theta})$, and $\mu(\underline{\theta}|\overline{q}) = 1$.*

Proof. The intuitive criterion imposes a restriction only on beliefs that are based on off equilibrium information sets (see footnote (11)). Hence, our separating equilibrium clearly satisfies the criterion. In the equilibrium with pooling on $\underline{q}$, $\overline{q}$ is equilibrium-dominated for the type $\overline{\theta}$ firm, since its equilibrium utility $w^*(\overline{\theta}) \equiv w(\underline{q}, \overline{d}; \overline{\theta}) > \max_d \; w(\overline{q}, d, \overline{\theta})$. Hence, the intuitive criterion implies that $\mu(\overline{\theta}|\overline{q}) = 0$. Since we must have $\mu(\underline{\theta}|\overline{q}) > 1/2$ and there is no equilibrium-dominated strategy for type $\underline{\theta}$, pooling on $\underline{q}$ is not eliminated by setting $\mu(\underline{\theta}|\overline{q}) = 1$. Consider now the equilibrium with pooling on $\overline{q}$. In this equilibrium, $\underline{q}$ is equilibrium-dominated for the type $\underline{\theta}$ firm, since this firm's equilibrium utility $w^*(\underline{\theta}) \equiv w(\overline{q}, \overline{d}; \underline{\theta}) > \max_d \; w(\underline{q}, d, \underline{\theta})$. Thus, the intuitive criterion requires that $\mu(\underline{\theta}|\underline{q}) = 0$ since $\underline{q}$ is not equilibrium-dominated for type $\overline{\theta}$. But, this is in contradiction with $\mu(\underline{\theta}|\underline{q}) > 1/2$, a condition re-

quired for equilibrium to exist. Hence, the intuitive criterion rules out this equilibrium with pooling on $\overline{q}$. □

Proposition 1 in the text merely states Claim 6. □

Proof of Proposition 2. Under complete information, equations (4) and (5) imply that $q^*(\overline{\theta}) = \underline{q}$ and $q^*(\underline{\theta}) = \overline{q}$. Let us examine next the firm-agency interaction in lobbying. First, consider the case where $\theta = \overline{\theta}$. Facing this high-cost firm, the agency maximizes its payoff by setting $d^*(\overline{\theta}, l) = \overline{d}$ for any $l \geq 0$. Since lobbying is costly for the firm, we obviously have $l^* = 0$ in this case. Let us now turn to the case where $\theta = \underline{\theta}$. The agency then would choose $d = \overline{d}$ if and only if $\underline{U} + \alpha l \geq \overline{U}$, that is, if and only if $l \geq l^{ci}$, where l^{ci} is as defined in the proposition. The $\underline{\theta}$-firm would want to induce a decision $\overline{d}$ from the agency if and only the benefit from this decision is larger than the cost of inducing it, namely, if and only if $2u(\overline{q}; \underline{\theta}) + \omega - l^* \geq 2u(\overline{q}; \underline{\theta})$, that is, if and only if $l^* \leq \omega$. Hence, $l^* = \min\{l^{ci}, \omega\}$. When $\omega < l^{ci}$, any level of lobbying $\tilde{l} \in [0, \omega]$ is a best response to the agency's decision since $\overline{d}$ is never chosen in equilibrium. □

Proof of Proposition 3. We prove the proposition using a series of claims:

Claim 7. *If $q^*(\underline{\theta}) = \overline{q}$ and $q^*(\overline{\theta}) = \underline{q}$, then equilibrium beliefs μ and ζ are such that the agency is completely informed on θ.*

Proof. The proof follows directly from the output strategies and the requirement of Bayesian consistency for equilibrium beliefs. □

Claim 8. *If $q^*(\underline{\theta}) = \overline{q}$ and $q^*(\overline{\theta}) = \underline{q}$, then the efficient firm's lobbying*

strategy is $l^*(\underline{\theta}) = \min\{l^{ci}, \omega\}$.

Proof. By Claim 7, the agency is completely informed and thus Proposition 2 can be used to obtain the case with $l^{ci} \leq \omega$. The case with $l^{ci} > \omega$ merely corresponds to a possible equilibrium response of the firm. □

Claim 9. *If* $q^*(\underline{\theta}) = \overline{q}$ *and* $q^*(\overline{\theta}) = \underline{q}$, $l^*(\underline{\theta}) = l^{ci}$ *and* $l^*(\overline{\theta}) = 0$, *and* $l^{ci} \leq \omega$, *then the incentive constraint of the efficient firm is given by* $l^{ci} \leq \Delta(\underline{\theta})$, *and there is no incentives constraint for the inefficient firm.*

Proof. The firm of type $\overline{\theta}$ obtains a protection by choosing its most preferred output choice $\underline{q}$ and setting $l^*(\overline{\theta}) = 0$. It thus has no incentive to deviate. The $\underline{\theta}$-type firm is successful in lobbying whenever $\omega \geq l^{ci}$. Under this case, it is not profitable for it to mimic the other type if and only if $2u(\overline{q}; \underline{\theta}) + \omega - l^{ci} \geq u(\underline{q}; \underline{\theta}) + u(\overline{q}; \underline{\theta}) + \omega$, i.e., if and only if $l^{ci} \leq \Delta(\underline{\theta})$. □

Claim 10. *Separating output strategies* $q^*(\overline{\theta}) = \underline{q}$ *and* $q^*(\underline{\theta}) = \overline{q}$, *lobbying strategies* $l^*(\overline{\theta}) = 0$ *and* $l^*(\underline{\theta}) = l^{ci}$, *and the agency's decision rule* $d^*(\overline{q}, l^{ci}) = d^*(\underline{q}, 0) = \overline{d}$, *together with associated beliefs* $\mu(\overline{\theta}|\underline{q}) = \mu(\underline{\theta}|\overline{q}) = 1$, $\zeta(\overline{\theta}|\mu(\overline{\theta}|q), 0) = \zeta(\underline{\theta}|\mu(\underline{\theta}|q), l^{ci}) = 1$, *constitute a PBE if* $l^{ci} \leq \min\{\Delta(\underline{\theta}), \omega\}$.

Proof. This claim follows from Claim 8 and Claim 9 and the fact that the two conditions $l^{ci} \leq \omega$ and $l^{ci} \leq \Delta(\underline{\theta})$ can be summarized by $l^{ci} \leq \min\{\Delta(\underline{\theta}), \omega\}$. □

Claim 11. *If* $q^*(\underline{\theta}) = \overline{q}$ *and* $q^*(\overline{\theta}) = \underline{q}$, *then these separating output strategies with* $l^*(\cdot) = 0$, *constitute a PBE if* $\omega < \min\{l^{ci}, \Delta(\underline{\theta})\}$.

Proof. With lobbying being too costly, i.e., $\omega < l^{ci}$, we just have to look at the incentive constraint of the efficient type when it cannot use lobbying under complete information. From Proposition 1, we know that it prefers not to switch from $\overline{q}$ to $\underline{q}$ if $\omega < \Delta(\underline{\theta})$. □

Proposition 3 then follows from merging Claim 10 and Claim 11. □

Proof of Proposition 4. The following series of claims will prove useful:

Claim 12. *If $q^*(\overline{\theta}) = q^*(\underline{\theta}) = \underline{q}$, then separating lobbying strategies are not optimal, i.e., one cannot have $l^*(\overline{\theta}) \neq l^*(\underline{\theta})$.*

Proof. Because of the consistency of beliefs, separating lobbying strategies imply that the agency is completely informed, so that the efficient firm has to made lobbying up to l^{ci} to obtain protection. But then, by backward induction, it is easy to see that the pooling output strategy for this firm is no longer optimal (under complete information, only the efficient output choice is optimal). □

Observe that Claim 12 precludes separating lobbying strategies in equilibrium if there is pooling on output. Let us denote by $\tilde{l}$ the level of lobbying on which the two types pool. As out-off equilibrium beliefs are needed to compute lobbying strategies, let us suppose from now on that second posterior beliefs are given by:

$$\zeta(\underline{\theta}|\mu(\underline{q}), l) = \begin{cases} \mu(\underline{\theta}|q) & \text{if } l \leq \tilde{l} \\ 1 & \text{if } l > \tilde{l} \end{cases} \tag{23}$$

Then, the following is true:

Claim 13. *If $q^*(\overline{\theta}) = q^*(\underline{\theta}) = \underline{q}$ and second posterior beliefs satisfy (23), then the level of lobbying necessary to induce protection is $\tilde{l} \geq 0$ if $p \leq 1/2$ and $\tilde{l} \geq l^{ii} \equiv (\overline{U} - \underline{U})(2p-1)/\alpha$ if $p > 1/2$.*

Proof. By Bayes' rule $\mu(\underline{\theta}|\underline{q}) = p$, and thus $\zeta(\underline{\theta}|\mu(\underline{\theta}|\underline{q}), \tilde{l}) = p$. If $p \leq 1/2$, $pU(\overline{d}, \underline{\theta}) + (1-p)U(\overline{d}, \overline{\theta}) \geq pU(\underline{d}, \underline{\theta}) + (1-p)U(\underline{d}, \overline{\theta})$, and hence $d^* = \overline{d}$ without lobbying. For $p > 1/2$, the level of lobbying under incomplete information, l^{ii}, can easily be seen to solve $pV(l^{ii}, \overline{d}; \underline{\theta}) + (1-p)V(l^{ii}, \overline{d}; \overline{\theta}) - pV(0, \underline{d}; \underline{\theta}) - (1-p)V(0, \underline{d}; \overline{\theta}) = 0$, where $V = U(d; \theta) + \alpha l$, and hence is given by $(2p-1)(\overline{U} - \underline{U})/\alpha$ as stated in the claim. □

Claim 14. *If $q^*(\overline{\theta}) = q^*(\underline{\theta}) = \underline{q}$, second posterior beliefs satisfy (23), and $p > 1/2$, lobbying is effective for both firms, i.e. $l^*(\cdot) > 0$, only if $l^{ii} \leq \min\{u(\overline{q}; \underline{\theta}) - u(\underline{q}; \overline{\theta}), \omega\}$.*

Proof. Using Claim 12 and Claim 13, $l^{ii} \leq \omega$ is the only condition required for the $\underline{\theta}$-type. For the other type, the following constraint must hold:

$$u(\underline{q}; \overline{\theta}) + u(\overline{q}; \underline{\theta}) - l^{ii} \geq 2u(\underline{q}; \overline{\theta}) \tag{24}$$

Hence, lobbying is effective only if $l^{ii} \leq \min\{u(\overline{q}; \underline{\theta}) - u(\underline{q}; \overline{\theta}); \omega\}$. □

Now, in order to check the incentive constraint, one needs to specify out-off equilibrium first posterior beliefs. Let us suppose that

$$\mu(\underline{\theta}|q) = \begin{cases} p & \text{if } q = \underline{q} \\ 1 & \text{if } q = \overline{q} \end{cases} \tag{25}$$

Then, the following result holds:

Claim 15. *If $q^*(\overline{\theta}) = q^*(\underline{\theta}) = \underline{q}$, $l^*(\cdot) = l^{ii} \leq \min\{u(\overline{q};\underline{\theta}) - u(\underline{q};\overline{\theta}), \omega\}$, and first and second posterior beliefs satisfy (25) and (23) respectively, then the incentive constraint of the efficient type is given by $\Delta(\underline{\theta}) + l^{ii} \leq \min\{l^{ci}, \omega\}$ when $p > 1/2$, and $\Delta(\underline{\theta}) \leq \min\{l^{ci}, \omega\}$ when $p \leq 1/2$, and there is no incentive constraint for the inefficient firm.*

Proof. First, let us examine the case where $p \leq 1/2$ which implies a decision $d = \overline{d}$ of the agency if there is pooling on output. An optimal lobbying decision is then to set $\tilde{l} = 0$. Furthermore, the $\overline{\theta}$-firm has no incentives to deviate since it gets its maximum payoff. For the $\underline{\theta}$-firm, let us denote $l(\overline{q})$ the amount of lobbying necessary for it to induce a positive decision $\overline{d}$ when its choice of output is $\overline{q}$. Then, this firm prefers $\underline{q}$ over $\overline{q}$ if and only if

$$2u(\overline{q};\underline{\theta}) + \omega - l(\overline{q}) \leq u(\underline{q};\underline{\theta}) + u(\overline{q};\underline{\theta}) + \omega \tag{26}$$

when it can and indeed chooses to lobby, and if and only if

$$2u(\overline{q};\underline{\theta}) \leq u(\underline{q};\underline{\theta}) + u(\overline{q};\underline{\theta}) + \omega \tag{27}$$

otherwise. By assumption (25), one must have $l(\overline{q}) = l^{ci}$. Hence, there is no profitable deviation if and only if $\Delta(\underline{\theta}) \leq l^{ci}$ and $\Delta(\underline{\theta}) \leq \omega$, i.e., if and only if $\Delta(\underline{\theta}) \leq \min\{l^{ci}, \omega\}$. Consider now the case where $p > 1/2$, which implies that $d = \underline{d}$ if there is no lobbying by both types. Given the second posterior beliefs (23), $l = \tilde{l} = l^{ii}$ is optimal, provided that lobbying is effective (see Claim 14). Concerning the choice of q, one has to insure that firm $\underline{\theta}$'s incentive constraint is satisfied. This firm prefers $\underline{q}$ over $\overline{q}$ if and only if

$$2u(\overline{q};\underline{\theta}) + \omega - l(\overline{q}) \leq u(\underline{q};\underline{\theta}) + u(\overline{q};\underline{\theta}) + \omega - l^{ii} \tag{28}$$

when it can and indeed chooses to lobby, and if and only if

$$2u(\overline{q};\underline{\theta}) \leq u(\underline{q};\underline{\theta}) + u(\overline{q};\underline{\theta}) + \omega - l^{ii} \tag{29}$$

otherwise. By assumption (25), one must have $l(\overline{q}) = l^{ci}$. Hence, there is no profitable deviation if and only if $\Delta(\underline{\theta}) + l^{ii} \leq l^{ci}$ and $\Delta(\underline{\theta}) + l^{ii} \leq \omega$, i.e., if and only if $\Delta(\underline{\theta}) + l^{ii} \leq \min\{l^{ci}, \omega\}$. □

Merging Claim 13, Claim 14, and Claim 15 yields Proposition 4. □

Proof of Proposition 6. Consider the effect of a reform that increases Ψ from Ψ_1 to Ψ_2 with Ψ_1, $\Psi_2 \in \mathcal{I}_\Psi$. Let h be the strictly increasing function that associates to each level of Ψ a level of the imitation cost $\Delta(\underline{\theta})$. An examination of the conditions that define the feasible equilibria suggests to consider the cases where $l^{ci} \leq \omega$ and $l^{ci} > \omega$ in turn.

So, first assume that $l^{ci} \leq \omega$. Then, by Proposition 3, $A_{\Psi_1} \in \{\mathrm{P}_l(\Psi_1), \mathrm{S}_l(\Psi_1)\}$ and $A_{\Psi_2} \in \{\mathrm{P}_l(\Psi_2), \mathrm{S}_l(\Psi_2)\}$. To conclude that reforming an antidumping legislation of type Ψ_1 with one of type Ψ_2 ($\Psi_1 < \Psi_2$) cannot worsen welfare, one only needs to show that a move from $\mathrm{S}_l(\Psi_1)$ to $\mathrm{P}_l(\Psi_2)$ is not possible. Suppose it is, i.e., that $A_{\Psi_1} \in \{\mathrm{S}_l(\Psi_1)\}$ and $A_{\Psi_2} \in \{\mathrm{P}_l(\Psi_2)\}$. By Proposition 3, $h(\Psi_1) \geq l^{ci}$ and by Proposition 4, $h(\Psi_2) + l^{ii} \leq l^{ci}$ which implies $h(\Psi_2) < l^{ci}$ since $l^{ii} > 0$ when $p > 1/2$. Combining these inequalities yields $h(\Psi_2) < h(\Psi_1)$ which says that h is strictly decreasing, a contradiction.

Let us now examine the case with $l^{ci} > \omega$. By Proposition 3, $A_{\Psi_1} \in \{\mathrm{P}_l(\Psi_1), \mathrm{S}_{nl}(\Psi_1)\}$ and $A_{\Psi_2} \in \{\mathrm{P}_l(\Psi_2), \mathrm{S}_{nl}(\Psi_2)\}$. To conclude that reforming Ψ_1 with Ψ_2 weakly enhances welfare, one needs to show that a move from $\mathrm{S}_{nl}(\Psi_1)$ to $\mathrm{P}_l(\Psi_2)$ is ruled out by our assumption about h. Suppose not, i.e.,

that $A_{\Psi_1} \in \{S_{nl}(\Psi_1)\}$ and $A_{\Psi_2} \in \{\mathrm{P}_l(\Psi_2)\}$. By Proposition 3, $h(\Psi_1) > l^{ci}$ and by Proposition 4, $h(\Psi_2) + l^{ii} \leq \omega$, the latter inequality implying that $h(\Psi_2) < \omega$, since $l^{ii} > 0$ when $p > 1/2$. Thus, $h(\Psi_2) < h(\Psi_1)$, which is a contradiction. □

References

Anderson, J.E., 1994, "Strategic Lobbying and Antidumping," *Journal of Economic Integration*, 9(2): 129-55.

Ball, R.J., 1995, "Interest Groups, Influence, and Welfare," *Economics and Politics*, 7: 119-46.

Bennedsen, M. and S.E. Feldmann, 2003, "Information Lobbying and Political Contributions," manuscript, Harris School of Public Policy Studies, University of Chicago.

Blonigen, B.A. and T.J. Prusa, 2001, "Antidumping," National Bureau of Economic Research Working Paper 8398.

Boltuck, R.D. and R.E. Litan (eds), 1991, *Down in the Dumps: Administration of the Unfair Trade Laws*, Washington, DC: The Brookings Institution.

Brainard, S.L. and D. Martimort, 1997, "Strategic Trade Policy with Incompletely Informed Policymakers," *Journal of International Economics*, 42(1-2): 33-65.

Cho, I.K. and D. Kreps, 1987, "Signaling Games and Stable Equilibria," *Quarterly Journal of Economics*, 102: 179-222.

Finger, J.M., H.K. Hall and D.R. Nelson, 1982, "The Political Economy of Administered Protection, " *The American Economic Review*, 72: 452-466.

Fudenberg, D. and J. Tirole, 1991, *Game Theory*. MIT Press.

Gallaway, M.P., Blonigen, B.A., and J.E Flynn, 1999, "Welfare Costs of US Antidumping and Countervailing Duty Laws," *Journal of International Economics*, 49: 211-44.

Gasmi, F., W. Hansen and J.J. Laffont, 1996, "An Empirical Analysis of U.S. Antidumping Decisions," manuscript published as "Une Analyse Empirique des Décisions en Matière d'Antidumping aux Etats-Unis," *L'Actualité économique, Revue d'analyse économique*, 73 (1997): 423-55.

Gibbons, R.S., 1992, *A Primer in Game Theory*. Harvester-Wheatsheaf.

Grossman, G. and E. Helpman, 1994, "Protection for Sale," *American Economic Review*, 84(4): 833-50.

———————————, 2002, *Special Interest Politics*. MIT Press.

Hansen, W.L. and T.J. Prusa, 1996, "Economics and Politics: An Empirical Analysis of ITC Decision Making," *Review of International Economics*, 5(2): 230-45.

Hartigan, J., 1996, "Predatory Dumping," *Canadian Journal of Economics*, 5(2): 230-45.

Hindley, B. and P.A. Messerlin, 1996, *Antidumping Industrial Policy*. The AEI Press.

Kolev, D. and T.J. Prusa, 2002, "Dumping and Double Crossing: The (In)Effectiveness of Cost-Based Trade Policy under Incomplete Information," *International Economic Review*,

43(3): 895-918.

Moore, M.O. and S.M. Suranovic, 1992, "Lobbying vs Administered Protection: Endogenous Industry Choice and National Welfare," *Journal of International Economics*, 32(3-4): 289-303.

Prusa, T.J., 1992, "Why Are So Many Antidumping Withdrawn?," *Journal of International Economics*, 5: 1-20.

Rosendorff, B.P., 1996, "Voluntary Export Restraints, Antidumping Procedure, and Domestic Politics," *American Economic Review*, 86: 544-61.

Wright, D.J., 1998, "Strategic Trade Policy and Signaling with Unobservable Costs," *Review of International Economics*, 6(1): 105-19.

Zanardi, M., 2000, "Antidumping Law as A Collusive Device," manuscript, Boston College.