Anti-dumping Duty versus Price Negotiations

Arvind Panagariya and Poonam Gupta

1. INTRODUCTION

MULTILATERAL trade negotiations under the auspices of the General Agreement on Tariffs and Trade (GATT) have virtually eliminated the use of tariffs and quotas as tools of protection in the industrial sector in developed countries and have considerably reduced their scope in developing countries.[1] Since the demand for protection remains as strong as ever, however, this restraint on the use of the conventional instruments has led to the emergence of the GATT-sanctioned instrument of anti-dumping as the key instrument of protection.

Today anti-dumping is not confined to a few developed countries; given the intense pressure to eliminate import quotas and reduce tariffs, developing countries such as India, Mexico and South Korea are fast becoming regular users of it. The rapid spread of anti-dumping measures has, in turn, led trade theorists to shift the focus of research from the conventional trade-policy instruments to anti-dumping. Among the notable contributions to the fast-growing, albeit still infant, theoretical literature on the subject are Anderson (1992 and 1993), Ethier (1982), Fischer (1994), Gruenspecht (1988), Gupta (1997), Prusa (1992), Rosendorff (1996) and Staiger and Wolak (1992).

A key question relating to anti-dumping is the determination of the final outcome after a petition has been filed by the domestic industry. As shown in Figure 1, taken from Staiger and Wolak (1994), in the United States a case has four potential stages: (i) Within 45 days of filing of a petition by the domestic industry, the International Trade Commission (ITC) makes a preliminary determination of injury with investigation continuing further only if this determination is positive. (ii) In the next 115 days, the International Trade

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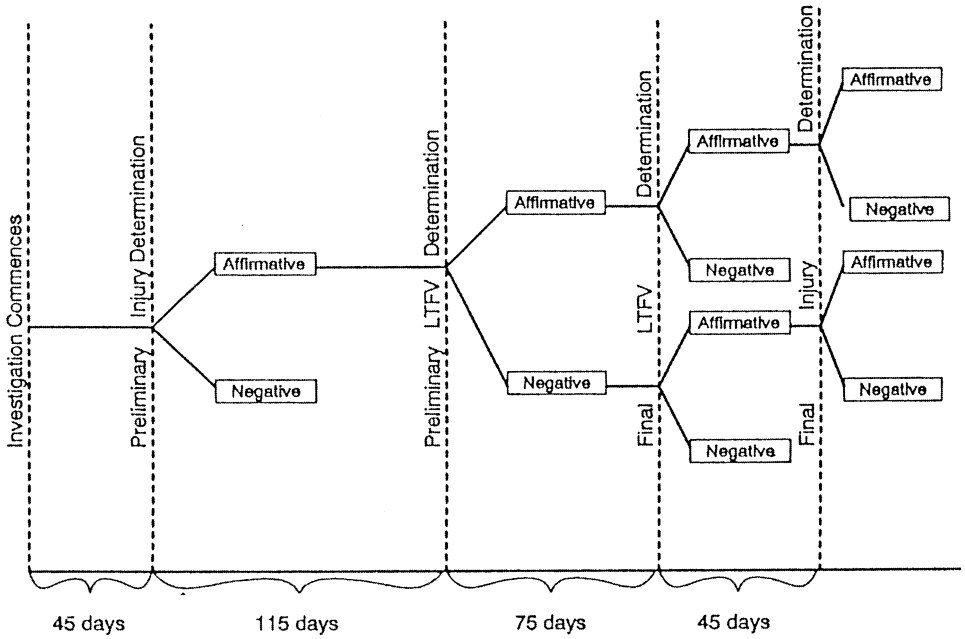
[1] Import quotas are generally prohibited by GATT and tariffs on industrial products in developed countries have fallen to an average level of three to five per cent and cannot be increased without compensating the countries adversely affected by the increase.

FIGURE 1
'Typical' Course of AD Investigation



Administration (ITA) of the Department of Commerce makes a preliminary determination whether there is reasonable evidence that the imported merchandise 'is being sold, or is likely to be sold, at less than fair value'. A negative finding does not terminate the investigation while a positive finding has to be accompanied by the determination of the 'dumping margin'. In the latter case, the importer is required to post a cash deposit or bond to cover the estimated dumping duties payable, pending the final outcome of the investigation. (iii) Within the next 75 days, ITA must make a final determination of dumping. If this decision is negative, the investigation is terminated. If affirmative, ITC must give a final ruling on injury. (iv) If both preliminary and final determination by ITA are positive, ITC must make a final injury determination within 45 days; otherwise within 75 days. If ITC's final finding is negative, the case is terminated and, if positive, the ITA has seven days to instruct customs officials to start collecting anti-dumping duties.

During the 120 days between ITA's preliminary determination of dumping and ITC's final determination of injury, the investigation may be terminated by the petitioner. Termination is usually the result of price agreements reached by the domestic industry and foreign firms named in the suit. Though direct conversations between domestic and foreign firms on prices and quantities are not permitted under the US anti-trust laws, settlements can be and are negotiated through the Commerce Department (Staiger and Wolak, 1994, n. 7).

In an important recent paper, provocatively titled 'Why are so many antidumping petitions withdrawn?', Prusa (1992) offers a Bertrand duopoly model in which a negotiated solution which leads to the withdrawal of petitions necessarily dominates the expected anti-dumping-duty outcome. He is, thus, able to explain the question posed in the title of his paper.

On the one hand, Prusa's paper explains an important stylised fact. But on the other, it leaves the reader with a puzzle opposite of the title of his paper: why are so few petitions withdrawn? If the negotiated solution necessarily dominates the expected anti-dumping outcome, why should *any* petitions reach the final stage of the process? Yet, according to DeVault (1993), in the United States, less than 25 per cent of the cases with affirmative preliminary determination during the 1980s resulted in voluntary settlement. An earlier, important paper by Tharakan (1991) had found that in the European Community, price undertakings accounted for 72 per cent of the investigations concluded during 1980–87. Though this number is larger than DeVault's, it too leaves out 42 per cent of the cases which are not settled.

In this paper, we consider the issue of negotiations versus anti-dumping duty outcomes systematically within a quantity competition model. Our results readily extend to Bertrand competition, however. Like Prusa (1992), we consider two types of negotiated agreements: (i) firms do not face any constraints and can raise the price to whatever level necessary to maximise their joint profits, and (ii) firms are restricted so as to hold the price at the level that would prevail if anti-dumping duty, assessed at the preliminary stage by the ITA, was imposed.

The key explanation we identify for why, depending on parameters, the outcome may be either anti-dumping duty or a price negotiation is based on asymmetric information. We first show that if the firms are free to negotiate an agreement, under complete information, they will always reach a price agreement and the home firm will choose to terminate the investigation. We then demonstrate that if the firms' information sets differ, they may fail to come to an agreement on price and the case may run its entire course and result in an anti-dumping duty. For example, if one firm knows whether the assessed duty will be high or low while the other does not, the negotiation may or may not materialise.

We also identify one case, principally of theoretical interest in which even with perfect information anti-dumping duty outcome may obtain. This case arises if the home firm is a Stackelberg leader and negotiations are constrained such that the price cannot exceed that under anti-dumping duty. It turns out that in this case, given the limit on the price, the home firm cannot improve its position beyond what it is able to do by exploiting its market power as a leader.

A key feature of the paper is its intuitive, diagrammatic approach. We are able to demonstrate all our results in the output space using the familiar reaction-curves diagram. In this respect, our approach is different from that of Prusa (1992) which carries out the analysis in the profit space thereby relegating the key choice variables of the firms to the background.

The paper is organised as follows. In Section 2, we introduce the model and analyse the Cournot case with complete information. This section assumes that when negotiations are constrained to hold the price at the anti-dumping-duty level, this level is determined by adding the dumping duty to the Cournot price. In Section 3, we show that the analysis remains valid if the foreign firm is allowed to choose its net price optimally under anti-dumping duty and the price under negotiations is constrained to this level. In Section 4, we consider the Stackelberg leadership equilibrium. Here we encounter the first case when a negotiation does not improve upon the anti-dumping-duty outcome. In Section 5, we allow for asymmetric information and show that it makes the outcome ambiguous. Whether the firms choose negotiation or let the petition run its full course depends on various parameters. Both outcomes are possible as observed in reality.

2. COMPLETE INFORMATION: THE COURNOT CASE

Let there be two countries, Home and Foreign. Each country has one firm. The firms compete as Cournot duopolists in the Home market. In the background, Foreign firm also sells the product in its own (i.e., Foreign) market but, following the standard practice, that market is not modelled explicitly.[2] Instead, it is *assumed* that the dumping charge stems from the firm selling the product at a higher price in its own market relative to that in the Home market.

To keep the analysis simple, we assume linear demand and constant marginal and average costs of production for the two firms. None of the key results will change if these assumptions are relaxed as long as they do not affect the general shapes of the associated reaction curves. Variables relating to Foreign firm are distinguished by an asterisk. The inverse demand function in the Home country is given by:

$$\begin{aligned} P &= a - bQ \\ &a - b(q + q^*) \end{aligned} \tag{1}$$

where P is the price and Q the total quantity purchased in Home. Variables q and q^* denote quantities sold by Home and Foreign firms, respectively. Letting c and c^* be the constant average and marginal costs, profits of the two firms may be written as:

$$\pi(q, q^*) = [a - b(q + q^*)]q - cq; \text{ and} \tag{2a}$$

$$\pi^*(q, q^*) = [a - b(q + q^*)]q^* - c^*q^*. \tag{2b}$$

[2] For a model in which the Foreign market is explicitly modelled, see Gupta (1997).

Under Cournot game, each firm maximises profits taking the other's output as given. This leads to reaction functions:

$$e - b(2q + q^*) = 0; \text{ and} \tag{3a}$$

$$e^* - b(q + 2q^*) = 0 \tag{3b}$$

where $e \equiv a - c$ and $e^* \equiv a - c^*$. Solving these equations, we obtain the usual Cournot equilibrium. Using subscript C to denote equilibrium values under Cournot equilibrium, we have:

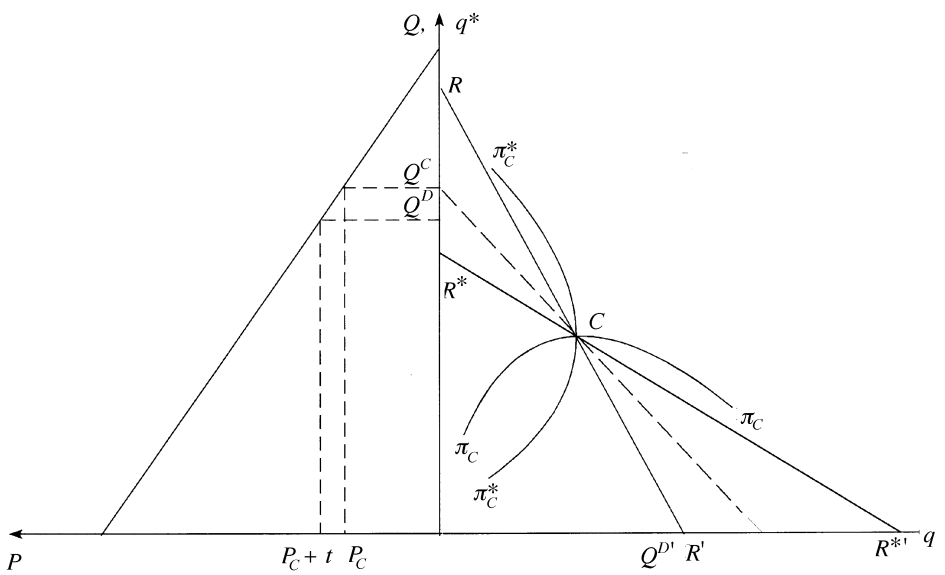
$$q_C = \frac{2e - e^*}{3b}; \quad q_C^* = \frac{2e^* - e}{3b} \tag{4a}$$

$$Q_C = \frac{e + e^*}{3b}; \quad P_C = a - \frac{e + e^*}{3} \tag{4b}$$

$$\pi_C = \frac{(2e - e^*)^2}{3b}; \quad \pi_C^* = \frac{(2e^* - e)^2}{3b}. \tag{4c}$$

This solution is shown in Figure 2 where the left-hand panel depicts the demand curve with quantity measured on the vertical axis and right-hand panel the Cournot equilibrium in (q, q^*) space. The right-hand panel assumes that the Home firm is less efficient than the Foreign firm, $c > c^*$. This assumption translates into a larger Cournot (and monopoly) output for the Foreign than Home firm. Cournot equilibrium is shown by point C with $\pi_C\pi_C$ and $\pi_C^*\pi_C^*$ showing

FIGURE 2



iso-profit curves of Home and Foreign firms, respectively. As usual, the Home firm's iso-profit curves are horizontal at the point of intersection with its reaction curve. Correspondingly, the Foreign firm's iso-profit curves are vertical at the point of intersection of its reaction curve. Profits rise as the firm moves towards its own axis along its reaction curve.

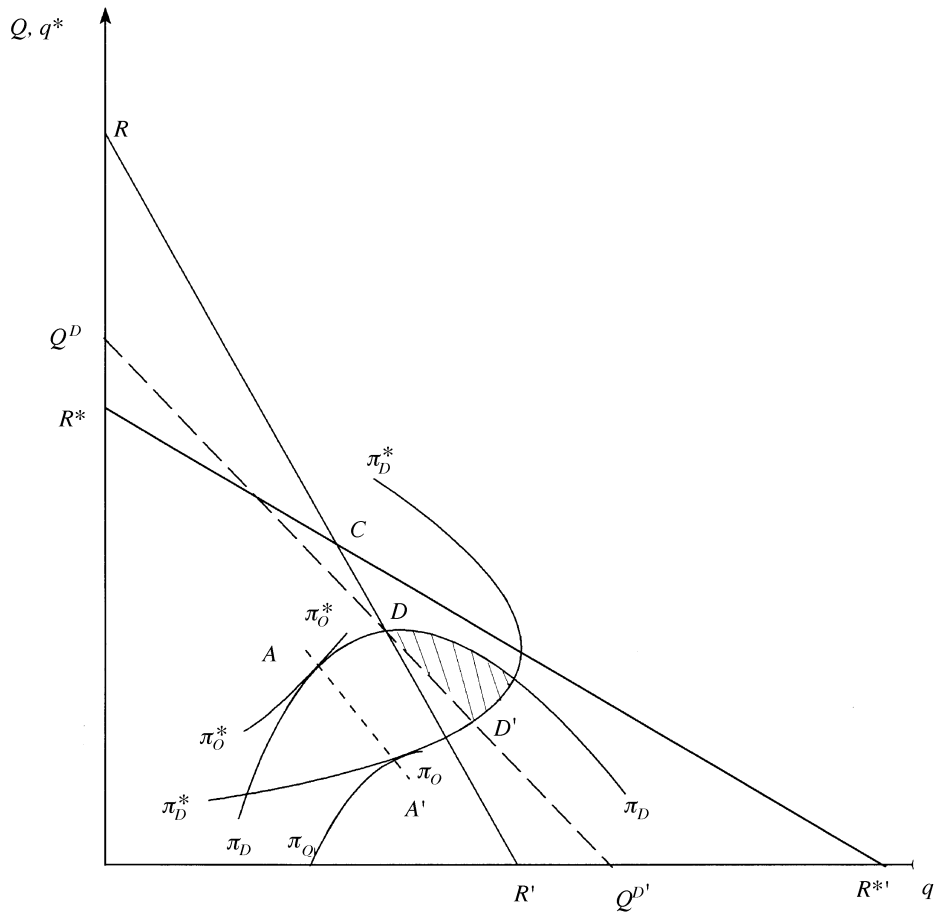
Draw the 45°-line $Q_C Q_C'$ through point C. The sum of the quantities along this line is $q_C + q_C^*$ everywhere. Therefore, point Q_C on the vertical axis also gives the total quantity supplied by Home and Foreign firms. In the left-hand panel, this point allows us to determine the equilibrium price, P_C, under Cournot competition.

Suppose now that a preliminary dumping determination is made. In this section, we follow Prusa (1992) in assuming that (i) if the firms fail to come to an agreement so that the Home firm withdraws the petition, there is a constant *ex ante* probability ρ that a duty at rate t per-unit will be imposed at the final stage of the investigation and (ii) if the duty is imposed, market price will have to rise to $P_C + t$. The latter assumption implies that in case the anti-dumping duty is imposed, the Foreign firm chooses to reduce its sales sufficiently to pass on the full burden of the duty to the consumer and receives the same net price P_C as under Cournot equilibrium. In general, the firm will have an incentive to lower its net price and hold on to a larger market share. For now we will ignore that possibility but return to it later in the paper.

Let us consider negotiations under two alternative assumptions as in Prusa (1992): (1) firms are unconstrained and (2) they are constrained such that the price cannot exceed $P_C + t$ and each firm must receive at least as high a profit as that expected under the dumping-duty equilibrium. Consider first the outcome in the former case whereby the firms are entirely free to set the price. Assume for ease of illustration that the probability of a positive determination of dumping at the final stage of the investigation is unity. We will return to the general case shortly. In the anti-dumping-duty equilibrium, given that the Foreign firm passes on the entire duty to consumers, the market price must rise to $P_D = P_C + t$, yielding quantity Q_D in Figure 2. The question is how this quantity is split between the two firms.

To answer, consider Figure 3 which suppresses the left-hand panel of Figure 2. From quantity Q_D, we draw a downward-sloping 45°-line. Because this line contains all combinations of q and q^* which sum to Q_D, the equilibrium under anti-dumping duty necessarily lies on it. Furthermore, since the Home firm continues to choose its profit maximizing q for each q^*, the equilibrium point also lies on RR'. Thus, the equilibrium is given by point D where the 45°-line intersects RR'. At this point, the Foreign firm sells q_D^* and the Home firm q_D. Compared to the Cournot equilibrium C, under anti-dumping duty, the Foreign firm is made necessarily worse off and the Home firm better off. The Home firm benefits from both an increase in the price as well as market share. Consumers are unambiguously worse off.

FIGURE 3



Continuing to assume the probability of a positive determination of duty to be unity, the next question is whether, given the option to negotiate an alternative price, the two firms can improve upon the outcome shown by point *D*. Given that the firms are free to choose any price now and the Home firm does not have to pay the anti-dumping duty, it should be hardly surprising that the answer to this question is in the affirmative. To show this formally, note that the Home firm's profit at *D* is given by its iso-profit function $\pi_D\pi_D$ passing through *D*. The Foreign firm's gross profit is also given by its iso-profit curve passing through *D* (not shown) but its net profit, exclusive of the anti-dumping duty $t.q_D$, is lower and is shown by a curve such as $\pi_D{}^*\pi_D{}^*$. By construction, it is immediate that the area inside the lens formed by the two iso-profit curves allows both firms to realise higher profits. As expected, the dumping-duty equilibrium is dominated by the negotiated equilibrium.

Not all the points inside the lens formed by $\pi_D\pi_D$ and $\pi_D{}^*\pi_D{}^*$ are equally efficient. By drawing additional iso-profit curves such as $\pi_0\pi_0$ and $\pi_0{}^*\pi_0{}^*$ (shown partially only) in Figure 3, we can determine the locus of Pareto-efficient outcomes. Segment AA' on this locus, which lies inside the lens, gives the set of efficient outcomes preferred to D. Precisely which of these outcomes is chosen depends on the bargaining power of the two firms and can be determined, for example, through a Nash bargain. Instead of outlining this bargain, we simply note that at the negotiated equilibrium, it is entirely possible for the Foreign country to raise its profit above the level achieved at the Cournot equilibrium.

The illustration in Figure 3 assumes the probability of a positive determination on the dumping petition at the final stage of investigation to be unity. A similar illustration can be provided, however, if the probability is zero. In this case, the firms' problem reduces to that of finding the set of points that are superior to the Cournot equilibrium which, as can be seen from Figure 2, is given by points in the lens formed by Cournot iso-profit curves. By extension, if the probability of a positive determination lies between 0 and 1, the relevant lens can be found by locating (expected) iso-profit curves:

$$E(\pi) = (1-\rho)\pi_C + \rho\pi_D = (1-\rho)\left[(P_C - c)q_C\right] + \rho\left[(P_D - c)q_D\right] \tag{5a}$$

$$E(\pi^*) = (1-\rho)\pi_C{}^* + \rho\pi_D{}^* = (1-\rho)\left[(P_C - c^*)q_C{}^*\right] + \rho\left[(P_D - c^* - t)q_D{}^*\right] \tag{5b}$$

The portion of the contract curve AA' in Figure 3 lying between these iso-profit curves gives the set of points over which the two firms must bargain.

Next, consider the constrained equilibrium. Recognising that the extension to the general case is trivial, we look at the solution to the problem for $\rho = 1$. In the constrained case, we are required to ensure that the consumer price be no higher than $P_D = P_C + t$. This, in turn, implies that the total quantity supplied be no less than Q_D. In addition, profits of each firm must be at least as high as at the dumping-duty equilibrium. The two conditions imply that, in Figure 3, the equilibrium be on or outside line $Q_DQ_D{}'$ and between iso-profit curves $\pi_D\pi_D$ and $\pi_D{}^*\pi_D{}^*$. The range of possible outcomes is, thus, restricted to the shaded area. It is easy to verify, however, that points not on DD' are dominated by one or more points on DD'. Therefore, the set of efficient points is given by segment DD'. Again, the precise outcome depends on the bargaining power of the two firms. Without outlining the solution, it is evident that the negotiated outcome dominates the dumping-duty equilibrium.

A reduced-form representation of these results can be given in the profit space as done in Prusa (1992) for the Bertrand case. Assume that profit functions $\pi(q, q^*)$ and $\pi^*(q, q^*)$ are concave in q and q^*. This condition is automatically satisfied for the linear case analysed above. Next, maximise $\pi^*(q, q^*)$ with respect to q and q^* subject to the restriction $\pi(q, q^*) \geq \bar{\pi}$ where $\bar{\pi} \geq 0$ is a pre-

specified level of profit for the Home firm. The Lagrangean expression associated with this problem is:

$$\underset{q,q^*}{\text{Max}}\ \phi = \pi^*(q, q^*) + \mu[\pi(q, q^*) - \bar{\pi}]. \tag{6}$$

The envelope function associated with this problem, denoted $\Psi(\bar{\pi})$, represents the profit possibilities curve (*PPC*). As defined in (6), shadow price μ is necessarily positive. Moreover, since the objective function is concave in q and q^*, the constraint set is convex in q, q^* and $\bar{\pi}$, and $\bar{\pi}$ appears in the constraint only, the envelope function is concave in $\bar{\pi}$ (Dixit and Norman, 1980, p. 322). Thus, we have:

$$\frac{d\pi^*}{d\bar{\pi}} \equiv \Psi(\bar{\pi}) = -\mu < 0; \qquad \frac{d^2\pi^*}{d\bar{\pi}^2} \equiv \Psi'(\bar{\pi}) \leq 0. \tag{7}$$

As expected, the *PPC* is concave to the origin and is represented by *EF* in (π, π^*) space in Figure 4. It can be shown that if the demand curve is linear and $c = c^*$, the *PPC* is also linear. The *PPC* corresponds to the contract curve AA' in Figure 3.

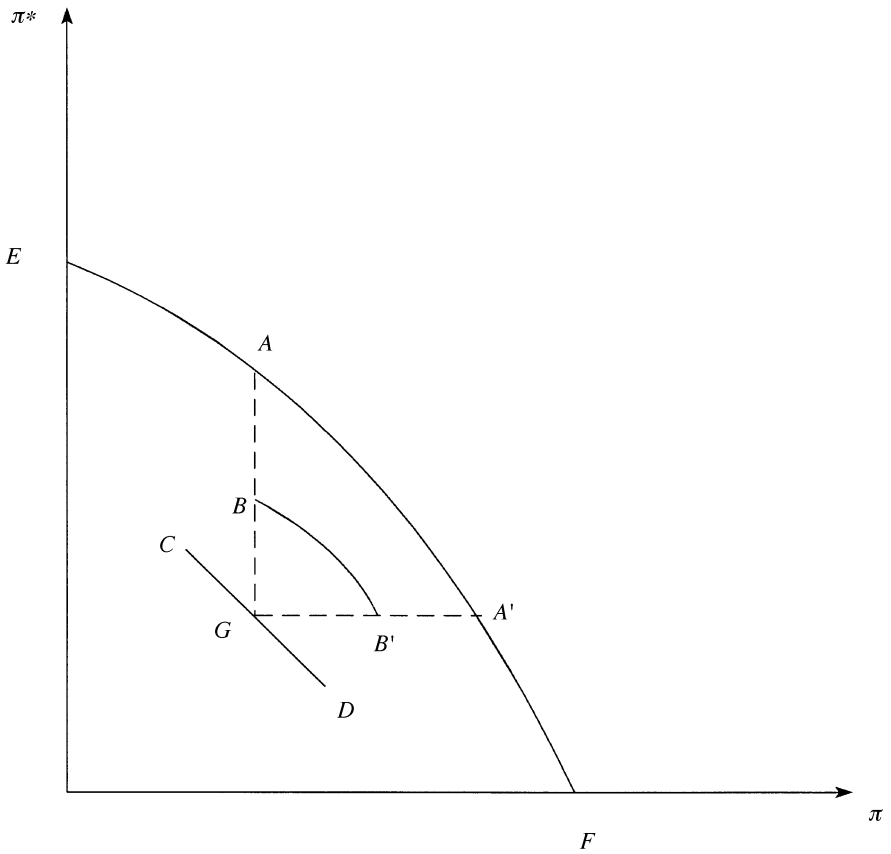
Let point *C* in Figure 4 represent Cournot equilibrium and *D* dumping-duty equilibrium when $\rho = 1$. These equilibria are off the contract curve AA' in Figure 3, explaining their location inside the *PPC* in Figure 4. Furthermore, relative to *C*, *D* is characterised by a higher profit for the Home firm and lower profit for the Foreign firm. For a value of ρ strictly between 0 and 1, the expected dumping-duty outcome lies somewhere between *D* and *C* on line *DC*. Letting *G* be that outcome, the unconstrained, negotiated outcome lies along segment AA' on the *PPC*. A Nash bargain can be employed to determine the precise location of the equilibrium along AA'.

If the negotiation is constrained such that the price is no higher than P_D and each firm makes at least as much in profits as it expects at point *G*, the set of possible outcomes lies inside the *PPC* along a path defined by end points on lines *GA* and GA'. Using an argument similar to that used for the *PPC*, it can be shown that this path will be concave to the origin. Thus, the path along which constrained equilibrium lies is given by the solution to the problem:

$$\underset{q,q^*}{\text{Max}}\ \Gamma = \pi^*(q, q^*) + \lambda[\pi(q, q^*) - \bar{\pi}] + \eta[P_D - P(q + q^*)] \tag{8}$$

where $P(q + q^*)$ is the inverse demand function in the general form in the Home market and is assumed to satisfy $P' < 0, P'' \leq 0$. This problem resembles (6) except that it imposes an extra constraint which makes the solution inferior to the one to the latter. Moreover, since the objective function is concave in q and q^*,

FIGURE 4



the constraint set is convex in q, q^*, $\bar{\pi}$ and P_D, and $\bar{\pi}$ appears in the constraint only, the envelope function is concave in $\bar{\pi}$ (and P_D). We can represent the solution by a curve such as BB'. Note that while the Home firm is better off everywhere along this curve than at Cournot equilibrium, the Foreign firm may be worse off everywhere or better off on a part of the curve.

3. COMPLETE INFORMATION: ENDOGENOUS PRICE UNDER COURNOT BEHAVIOUR

In the previous section we have assumed, as does Prusa for his Bertrand case, that under anti-dumping duty, authorities require the market price to rise by the full amount of duty. An alternative possibility is that once the duty is imposed, market price is left free. We now demonstrate that our results remain unchanged under this scenario.

Assuming that firms continue to behave as Cournot players, the equilibrium under an anti-dumping duty can be computed by replacing c^* by $c^* + t$ in

equations (2)–(4). From the second equation in (4b), we immediately see that for anti-dumping duty t, the market price rises by $t/3$ only. Thus, the Foreign firm chooses to pass on only one-third of the duty to consumers and makes up for the lower per-unit profit by retaining a higher share in the sales.

In terms of Figure 3, the equilibrium will now be at a point strictly between C and D on RR' reflecting a smaller decline in q^*. The remainder of our analysis remains unchanged, however. As in Figure 3, we obtain a lens within which, along the contract curve, the unconstrained negotiated equilibrium will be chosen. Similarly, drawing a 45°-line through the equilibrium point, we can obtain a region such as DD' along which the constrained negotiated equilibrium will obtain.

4. COMPLETE INFORMATION: THE STACKELBERG CASE

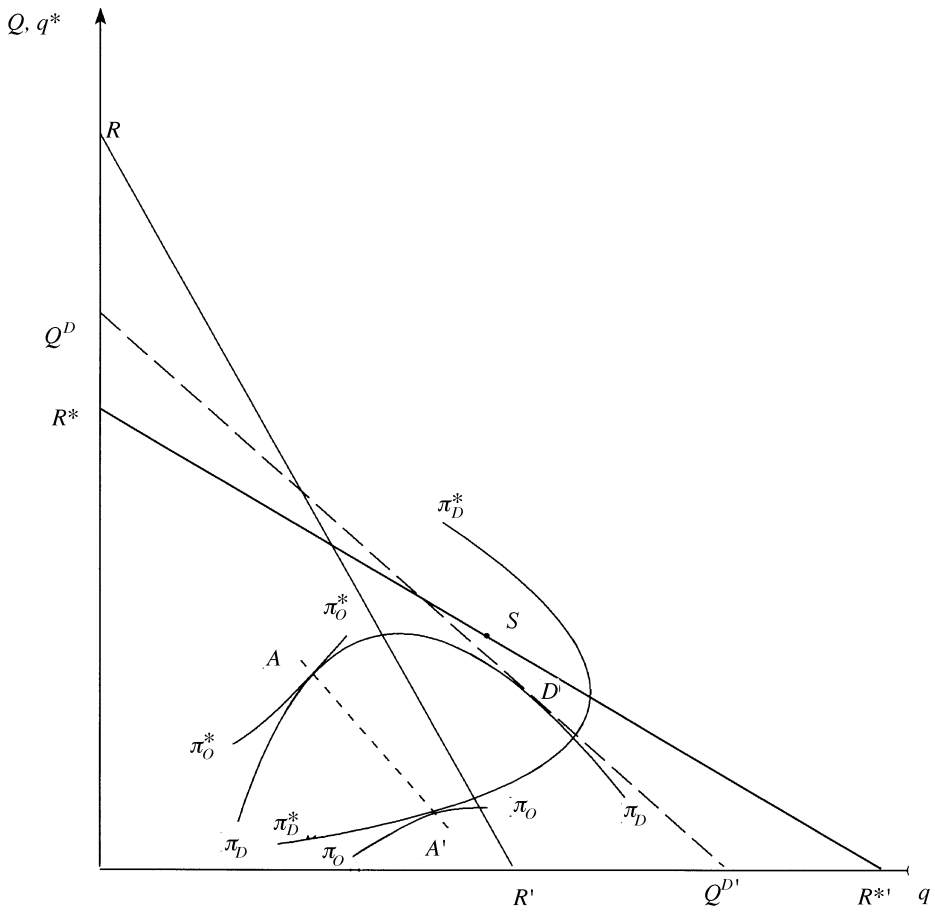
The analysis in the previous sections leads to the conclusion that with complete information and Cournot competition, firms always prefer a negotiated solution to expected anti-dumping outcome. Therefore, anti-dumping petitions will be necessarily withdrawn before they reach the final stage of litigation. In this section, we show that once Cournot competition is replaced by Stackelberg leadership on the part of the Home firm, the possibility arises that the latter will refuse to negotiate under the constraint that price cannot rise beyond the level achieved under anti-dumping-duty outcome. We assume throughout that under anti-dumping-duty equilibrium, the price must rise by t from its initial, Stackelberg level.

Figure 5 shows the case when the Home firm is the Stackelberg leader. This is an interesting case for at least two reasons. First, unlike all other cases considered so far, the Home firm is not on its own reaction curve in the initial equilibrium. Second and more importantly, as just noted, this is a case in which the Home firm will refuse to negotiate when negotiations are constrained to keep the price at the Stackelberg level plus duty.

In Figure 5, the Home firm is initially on the Foreign firm's reaction curve at S. Let the price at this point be P_S. By assumption, under anti-dumping duty, the market price is to rise to $P_D = P_S + t$. Suppose the Home and Foreign supplies that support this price are given along the 45°-line shown by Q_DQ_D'. This line now becomes the Foreign firm's reaction curve: to ensure the total supply equals the quantity indicated by Q_DQ_D', for each q, the Foreign firm must choose the corresponding q^* on this line. Therefore, the Home firm will choose that q which maximises its profits along Q_DQ_D'. This point is given by D and the Home firm's profits by $\pi_D\pi_D$. Taking the anti-dumping duty into account, the Foreign firm's profits are given by $\pi_D^*\pi_D^*$.

If negotiations are unconstrained, there remains the possibility for both firms to benefit by moving to the contract curve within the lens formed by iso-profit

FIGURE 5



curves of the two firms. If negotiations require that the total quantity be held along $Q_D Q_D'$, however, the Home firm has no incentive to negotiate. Given that the Foreign firm must choose a point on $Q_D Q_D'$, it is already maximising its profits at point *D*. Thus, in this case, anti-dumping-duty equilibrium will be observed.

A similar outcome fails to emerge, however, if the Foreign firm is initially the leader and the Home firm behaves as a Cournot player. The reason is that once an anti-dumping petition is filed, the nature of the game changes. The burden of ensuring an increase in the market price by the amount of duty falls on the Foreign firm which, in turn, constrains its market power as a Stackelberg leader and leaves room for superior negotiated outcomes even if the price constraint is in effect.

FIGURE 6

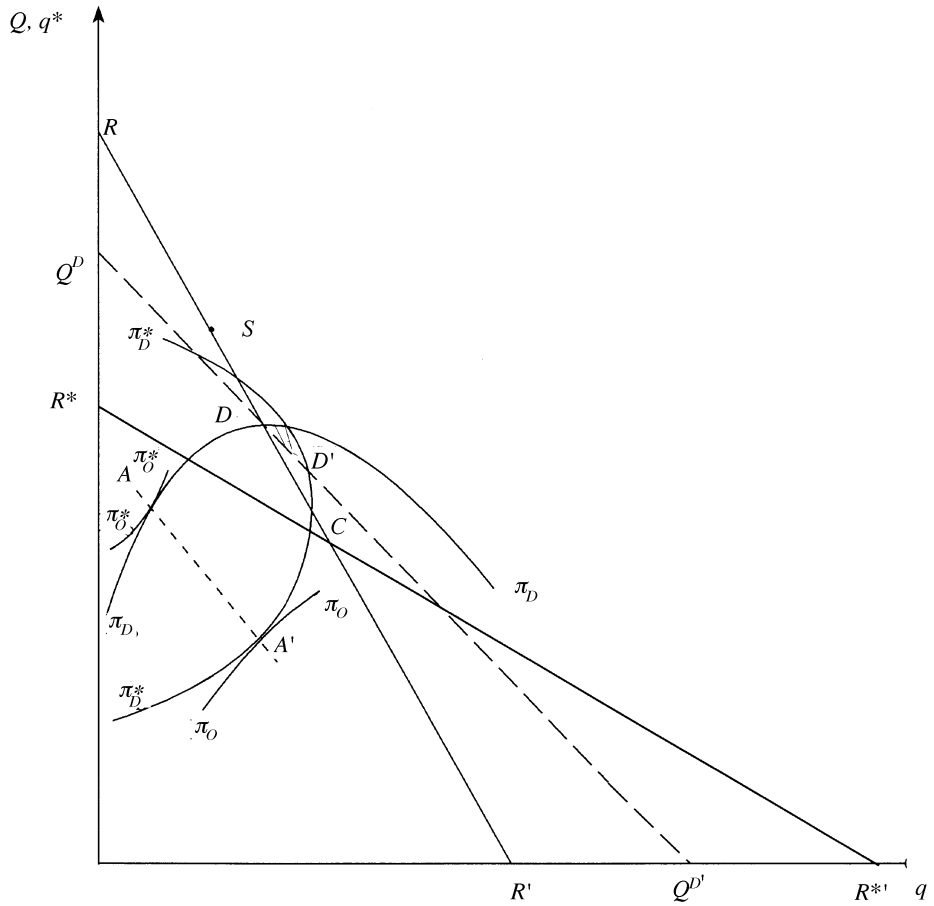


Figure 6 illustrates the case. The initial equilibrium is at point *S* where the Foreign firm's iso-profit curve (not shown) is tangent to RR'. By assumption, the dumping-duty equilibrium requires the Foreign firm to reduce its sales so as to allow the Home firm to move to point *D* along its reaction curve. As in Figure 3, $\pi_D\pi_D$ is the Home firm's iso-profit curve associated with point *D* and $\pi_D{}^*\pi_D{}^*$ the Foreign firm's iso-profit curve net of dumping duty. If an unconstrained negotiation is permitted, the two firms will take that option. The equilibrium will be somewhere on the contract curve inside the lens formed by the two iso-profit curves shown.

The negotiation option will also be taken if the price is constrained to be no higher than P_D. As in Figure 3, this is shown by drawing the 45°-line through point *D* in Figure 6. This yields us segment DD' along which price remains at P_D

and both firms can do better than at the dumping-duty equilibrium. Negotiations necessarily dominate anti-dumping duty.

5. ASYMMETRIC INFORMATION: THE COURNOT CASE

We now turn to an asymmetric information case and show that it can lead to dramatically different results. We demonstrate that with information asymmetry, the two firms may fail to arrive at a negotiated equilibrium even if they are left entirely unconstrained. Because the source of asymmetry is unimportant for the result, we will take the simple case in which one of the two firms has perfect knowledge of the outcome at the final stage of investigation whereas the other firm knows it only probabilistically. We will assume that since the Foreign firm knows the price at which it sells the product in its domestic market, it is informed about the final outcome with certainty. The Home firm, on the other hand, expects acquittal with probability $1-\rho$ and a duty at rate t with probability ρ. Alternatively, one could argue that the Home firm understands better legal institutions at Home and therefore has complete information about the outcome whereas the Foreign firm knows the outcome only probabilistically.

Taking the first interpretation, expected profits of the Home firm are given by (5a). For convenience, let us reproduce this equation:

$$E(\pi) = (1-\rho)\pi_C + \rho\pi_D = (1-\rho)[(P_C - c)q_C)] + \rho[(P_D - c)q_D] \qquad (9a)$$

where P_D is the price if anti-dumping duty is imposed and π_D the associated profit. If the Foreign firm is required to raise its initial price by the full amount of the duty, $P_D = P_C + t$ and if it is free to choose the price, $P_D = P_C + (t/3)$ as explained in Section 3, our results are unaffected qualitatively by the choice of P_D between these two alternatives. In Figure 7, we represent equation (9a) by iso-profit curve labelled $\pi_E\pi_E$.

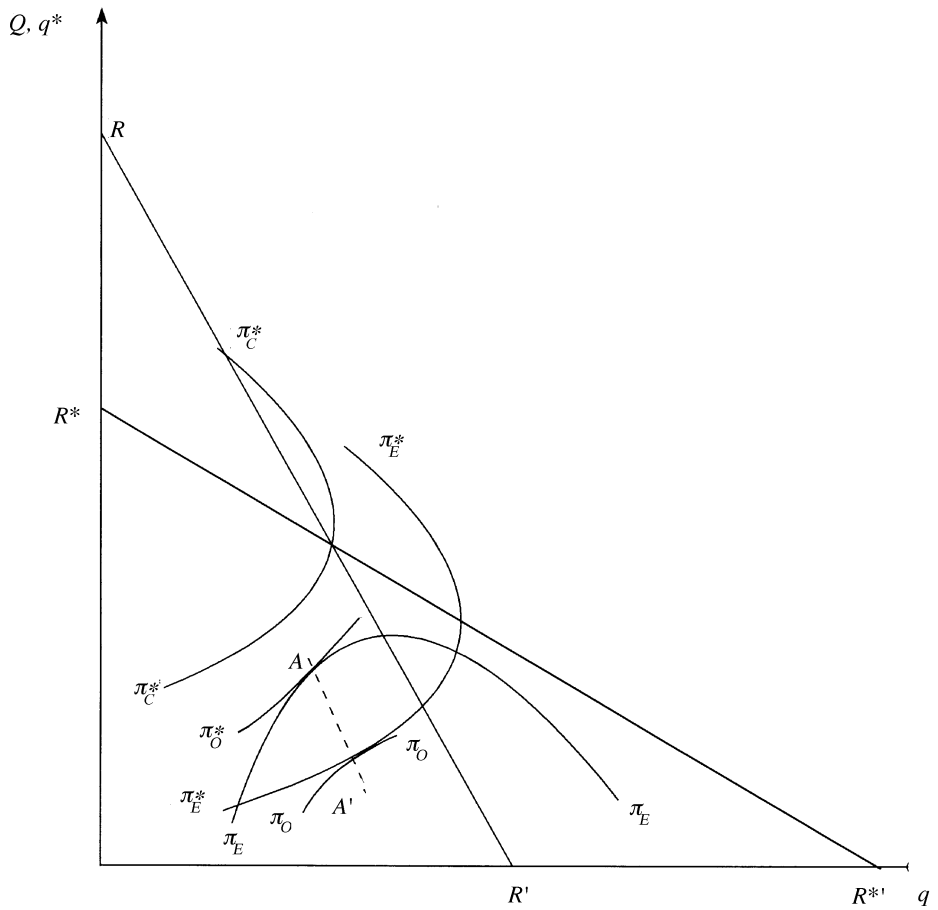
Corresponding to (9a), the Foreign firm's profits, *as expected by the Home firm*, are:

$$E(\pi^*) = (1-\rho)\pi_C^* + \rho\pi_D^* = (1-\rho)[(P_C - c^*)q_C^*)] + \rho[(P_D - c^* - t)q_D^*]. \qquad (9b)$$

In Figure 7, these profits are shown by $\pi_E^*\pi_E^*$. If no constraints are imposed on negotiations, the Foreign firm will negotiate along contract curve AA' inside the lens formed by iso-profit curves $\pi_E\pi_E$ and $\pi_E^*\pi_E^*$. The question is whether the Foreign firm will be willing to take any of the outcomes on AA'.

The answer clearly depends on what the final outcome of the anti-dumping suit at the final stage is. If the outcome is affirmative, the Foreign firm knows that its true iso-profit curve under anti-dumping lies below that shown in Figure 7 so that AA' offers it better opportunities than it is willing to settle for. It will quietly negotiate.

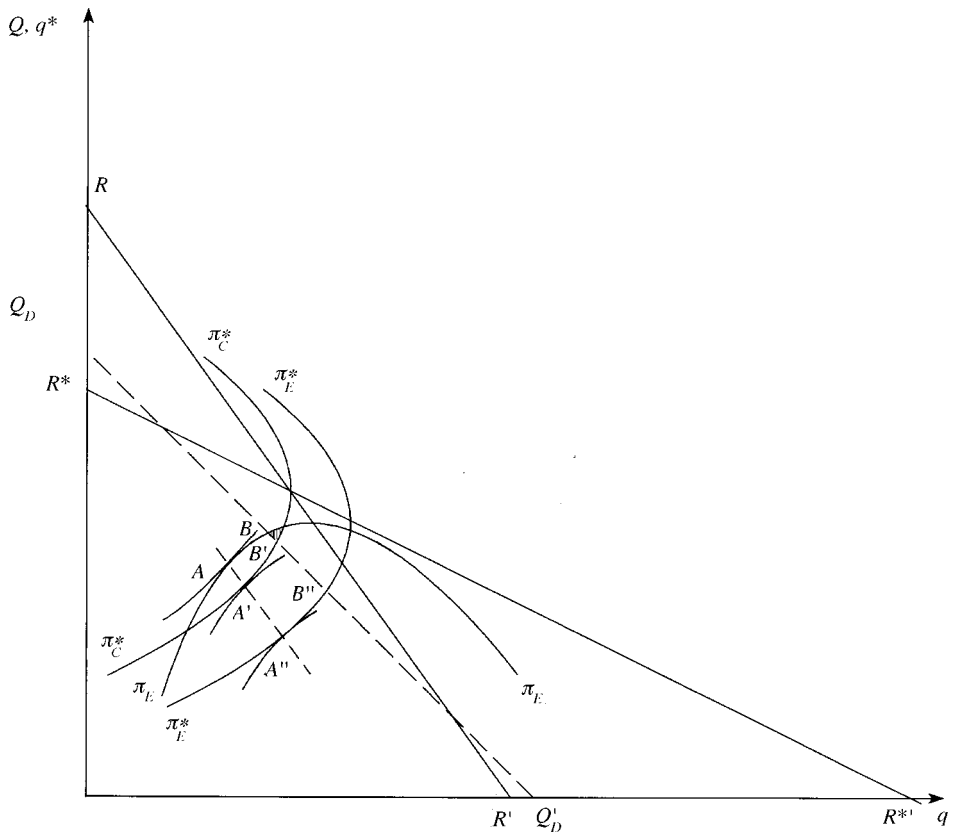
FIGURE 7



If the true outcome is acquittal, however, the Foreign firm knows that it has the Cournot option available with certainty. Therefore if, as drawn in Figure 7, its profit associated with the iso-profit curve passing through point A is lower than π_C^*, it will refuse to negotiate and leave the Home firm with a positive probability of getting an affirmative determination. Interestingly, however, if the reverse is true, it may negotiate even though it knows that it will be acquitted at the final stage.

What happens if the negotiation is constrained to hold the price at or below P_D and the final outcome is acquittal? Contrary to what one might expect, a successful negotiation may still take place though it is not inevitable. Thus, in Figure 8, let $\pi_E\pi_E$ represent the Home firm's expected profits. Let dotted 45º-line represent $q + q^* = Q_D$. The segment BB' still offers combinations with higher potential profits for both firms than they expect in the absence of the negotiation.

FIGURE 8



As long as $\pi_C^*\pi_C^*$ crosses the 45º-line, $q + q^* = Q_D$, before it crosses $\pi_E\pi_E$, the region permitting higher expected profits for both firms under constrained negotiations will exist. The reason a successful negotiation is not inevitable, however, is that the Foreign firm views BB' as the object of bargaining whereas the Home firm considers BB'' as the relevant pie. This difference in perception can still result in a lack of agreement.

6. CONCLUSIONS

In this paper, we ask the question why some anti-dumping petitions are terminated following a preliminary determination of injury and dumping while others run their full course. Our explanation is based on asymmetric information. We show that starting from a Cournot equilibrium, under complete information, firms find it necessarily optimal to negotiate an agreement and terminate the

petition prior to reaching the final stage of the process. Under asymmetric information, by contrast, depending on parameter values, both negotiated and anti-dumping-duty outcomes are possible. We also point out a case based on Stackelberg leadership status of the home firm in which a price negotiation may fail to avert the imposition of anti-dumping duty.

We note that the analysis in this paper is incomplete in one key respect. We have simply shown the *possibility* of a failure of negotiations. We have not derived the precise equilibrium that will obtain in the presence of asymmetric information under alternative assumptions and parameter values. For example, the nature of the equilibrium will depend crucially on whether the Home or Foreign firm is better informed. We propose to take up this important issue in a future paper.

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