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ANTIDUMPING POLICY

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We examine antidumping policy in a model where a foreign firm is a monopolist in the foreign market, but competes with a native firm in the home market. An antidumping policy changes strategic behavior by giving firms an incentive to manipulate the price differential between home and foreign markets. Under quantity-setting behavior, an antidumping policy often improves the home country's welfare. The welfare of the foreign country may also improve. Under price-setting behavior, an antidumping policy worsens the home country's welfare unless the foreign firm has a large cost advantage [or unless entry occurs]. The foreign country often suffers a welfare loss, although this result may be reversed when firms produce imperfect substitutes.

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ANTIDUMPING POLICY
1. Introduction
Dumping, as defined most simply, is the sale of goods for export at a
price below that available in the local market. 1 Economists have devoted much attention to analyzing dumping,2 but they have paid little attention to analyzing antidumping policy.3 This omission may have occurred because economists have found little reason to justify antidumping policy except in cases of predation. Ethier (1983), in describing a commonly-held view, asks "Why do countries have antidumping laws at all. since the opportunity to buy goods at a low price would seem to be a good thing." Hence. antidumping . policy must be counterproductive since it raises the price of imports.
This view of antidumping policy, however. is not complete. By itself.
a commitment to an antidumping policy may change strategic behavior in imperfectly competitive markets. We show in this paper that the mere threat of antidumping enforcement may change firm behavior in a manner that raises the home country's welfare. Strategic behavior is altered because. as it is typically administered, an antidumping policy represents a credible threat to impose future duties based on 5556n

in the event that dumping is ultimately punished. These manipulations may produce positive or

policy on foreign welfare may be either positive or negative.
Under price competition, a commitment to an antidumping policy produces vastly different results. The imposition of antidumping duties can overwhelm the home firm's cost disadvantage, or improve its cost advantage, thereby creating significant changes in pricing behavior. A commitment to an antidumping policy worsens welfare in the home country, unless the home firm
is at a large cost disadvantage relative to the foreign firm. In addition,
this policy frequently lowers welfare in the foreign country.
We also examine whether the above results hold in the case of imperfect substitutes. Although these findings are not substantively changed under quantity competition, they are al92.33 Tm Tm (a223 0 0 11.1 13t.54 521

2. The Cournot Case
A multiperiod game would be a natural starting point for modelling
firm behavior under antidumping policy. To simplify the analysis. we examine a three-stage. two-period duopoly model. The game starts with a commitment by the policymaker. who chooses the extent to which she will punish dumping. Let It - 1 if dumping in period t is punished by the imposition of antidumping duties in period t+1. These duties equal the dumping margin [i. e.. the difference between prices in the home and foreign markets] in period t. 5 Otherwise. It - 0 if dumping in period t

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strategic behavior that arises from the threat of antidumping enforcement. By assumption, one foreign firm and one home firm compete in the home market. They produce perfect substitutes. Through a cost advantage, or imposed trade restraints, the foreign firm is a monopolist in its own market. Since the two markets are separable, the intensified in

home

We can also describe the foreign firm's local profits,
(4)
Solving by backward induction, we derive the output equilibrium in the
home market in the second period. The first-order conditions are:

where ' indicates the first derivative of the inverse demand function. As shown in the following conditions, we assume that marginal revenue is declining with respect to a firm's own output and its rival's output:9
(6)
(7)
Given the above conditions, a unique second-period Cournot-Nash equilibrium will exist for each value of I 1s1 [associated with an internal equilibria].

dumping in the first period is punished [i.e., I1 - 1], a change in the

market in the second-period Cournot-Nash equilibrium. When dumping in the first period is punished, an increase in the first-period dumping margin has the following effect on second-period profits:

a1fZN last! I1-l - pZ 'hZN(aHzN/as1)
- pZ'hzN[(a z1fz/ahzahz)/A] > 0

anZN /asd I1-l - -HZN + PZ'HZN(ahzN/aS1)
- - HzN[l + (pz'(a z1fz/ahzaHz)/A)] < 0 (9)
If dumping is punished, an increase in the dumping margin in the first period results in higher profits for the home firm and lower profits for the foreign

firm in the second period. For notational convenience, a1fZN/as1 and �a�n�~�/�a�s�1�

will hereafter refer to a1f

an antidumping policy is in effect. An output increase by the home firm causes price to fall in the home

lead to lower prices at home than abroad in the absence of an antidumping

policy. Letting FIN (8) , h1N(B), and H1N(B) represent equilibrium output

levels in the first period, this assumption implies that

We can now totally differentiate the first-

order conditions in equations (11)-(13), and evaluate at B - 0: 11

dh1N/dB I B-O - (Ap1, /A) [(81!'ZN/8s1) (8Zrrl

/8HI 8HI)

- (8rrZN/8s1) (8Z",1/8h18H1)] > 0,

dH1N/dB I B-O - (Ap1, /A) [- (8",ZN /8s1) (8Zrr1/8Hl8hl)

+ (8rrzN/8sl)(8z",l/8hl8hl)] < 0,

(14)

We conclude that:

11 For purposes of our analysis, an antidumping policy represents a commitment that dumping will be punished with positive probability. Hence, the effects of an antidumping policy are represented by a marginal increase in B from zero.
As B increases further, two interesting results arise: (1) dumping is
never eliminated completely, and (2) a mixed-strategy equilibrium may arise.
The intuition behind these results is as follows. From (11), it holds that
81!'/8hl - 8",l/8hl + AB(81!'zN/8sl)(dsl/dhl). Letting hlO(Fl,Hl) represent the
value of hl that solves pl(Fl) - pl(hl+Hl) - 0, it holds that sl(Fl,hl,Hl)
- (» 0 if hl «» hl o. Hence, .AB(81!'zN/8sl)(dsl/dhl) -(» 0 if hl «» hl o.

This result implies-that 8",/8hl is discontinuous, with an upward jump at hlo. lds) d",/8hTd (-406 -i]TJ)Tj 0.05 Tjat 7.19117741 0 0 1121 11197.042.85 2Nm (l)Tj 0.05 Tj832.6149 0 0 1131.042 14 182.85 (8)(ds) ddsld",/8hl) 1Tj 11.1 0 041506 494 14 182.85 > ())Tj 0.05 Tc225.7395 0 0 15.1 35 14 182.85 0]. (o. .1 400.6931 0 0 1102Tc 1181 182.85 If(the)Tj7.7395 0 0 112 0411181 182.85 (ence,)Tj --0.376 Tc 11.1 0 0 1491 422181 182.85 home m (l)Tj 0.05 Tc513.0768 0 0 1176. 1181 182.85 firmwith)4 125.3876 0 0 1202.741181 182.85 aceswith is ence, Tj028.6149 0 0 1157j1.1181 182.85 foreign(the)Tj71711.1 0 0 1506. 1181 182.85 firm,lves en(the)Tj004.1597 0 0 1102T102169c931.85 each(the)Tj513.0768 0 0 113Tc 22169c931.85 firmwith the ence, laesult the ence, o. Letting Tj1141597 0 0 1102T2601.8.112.85 policy.lves) Letting]TJ 0.05 1 10117741 0 0 122.61.8.112.85 occurs,lves the iTd () 1Tj787.1597 0 0 1181 082146.112.85 can(the)Tj319.7395 0 0 12.4 76146.112.85 neverlves)Tj470.7395 0 0 1240T253146.112.85 bence, the)

Proposition 1: An antidumping policy raises home output, lowers foreign exports, and raises foreign consumption in the first period.12

As shown below, the reduction in foreign exports may not exceed the increase in home output. Hence, the threat of antidumping enforcement may increase home consumption. In other words, the home country may benefit from lower

prices due to the threat of antidumping enforcement:13
Lemma 1: An antidumping policy lowers(does not change, raises) the first-

period price in the home country if 81f2N/8s

(A(pl,)2/A) > 0, it holds that d(h1N +HlN)/dO �~� 0 if �a�~�2�N�/�a�s�1� + arr2N /asl �~� 0 [1. e, if 8.,..H /8s1 �~� I arr2N last!] . If demand is linear, then �a�~�2�N� /8s1 + arr2N/as1 - (2/3) [h2N - 2H2N]. This expression is positive if h2N > 2H2N [i.e., if the foreign firm's market share is less than 1/3]. QED

The above results can be used to evaluate the impact of an antidumping

policy on first-period welfare.15 Welfare is measured as the aggregation of

we obtain:

Lemma 2: An antidumping policy raises (does not

An antidumping policy raises the home country's welfare in the first period whenever the foreign firm's share of the home market is 1/2 or less.

Since Proposition 3 provides only a sufficient condition, an antidumping policy may improve the home country's welfare in the first period even if the foreign firm's market share is significantly greater than one half.
A commitment to an antidumping policy causes the home firm to boost
its first-period output in order to increase any imposed antidumping duty. This increase in output raises the home country's welfare, since the home-market price exceeds the home firm's marginal cost. An offsetting welfare effect may occur, however, because the foreign firm reduces its first-period exports [in order to lower any imposed duty]. By itself, this action raises

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Hence, a commitment to an antidumping policy does not change the "strategic" nature of the home firm's behavior. As we shall show, the foreign firm may continue to act strategically depending on the size of its cost advantage. Welfare results depend on which firm possesses a cost advantage, and in some cases, the magnitude of the cost advantage.
Under Bertrand behavior with perfectly substitutable goods, a given
firm has incentive to undercut its rival's price wt1.1 525.01 651.13 61h2r11. 401.98

punished, the foreign firm must pay an antidumping duty of P*rn - kl during
the second period. Since antidumping enforcement has conveyed an artificial
cost advantage upon the home firm, the equilibrium second-period price in the
home market becomes kz + (P*rn-k1) [or Pm' where �p�~� is the monopoly price
level] .21 The home firm now serves the entire home market, but antidumping enforcement has succeeded in raising price above kz in the second period.
Hence, the home country's welfare declines in the second period, whicv690.48 T

price, Pl, at k, and captures the home market.22 This strategy minimizes the dumping margin, since the foreign firm charges the highest possible export price that still allows it to serve the market.
The foreign firm could set its first-period local price at �P�*�~�,� which
would result in a dumping margin of �P�*�~� - k. If antidumping duties were imposed, then the foreign firm's export cost would equal K + �(�P�*�~�-�k�)� in the second period. Having assumed that k �~� �(�K�+�P�*�~�)�/�2�,� it follows that K + � (�P�*�~�-�k�)� �~� k. We conclude that when the foreign firm sets its local price at or below the monopoly level in the first period, then it still possesses a cost advantage in the second period even if dumping is punished. Hence, the foreign firm's optimal strategy is to always maintain

follows from (21) that P*lN < P*1M. 24 In order to lower any subsequent duties, the foreign firm reduces its local price below the monopoly level in the first period.
Since an antidumping policy leads to a price reduction in the foreign market, the foreign country's welfare increases in the first period. The home country's welfare is unaffected in the first period because the home-market price remains at k.
The home-market price also remains at k in the second period; however,
the home country now collects antidumping duties with positive probability. Accordingly, the home country's welfare increases in the second period, which implies that it increases overall. Due to the payment of antidumping duties, the foreign country's welfare decreases in the second period.

an antidumping policy, the foreign firm still sets its export price at k in the first period, and captures the entire home market. However, in order to maintain a cost advantage in the second period under antidumping enforcement, the foreign firm must now set its

antidumping enforcement, the home firm serves the entire home market in the second period, and sets price at either K + (P*rn - k) or �p�~�.� Both of these prices exceed k, which is the second-period price in the absence of an antidumping policy.
Hence, as k �~� K+, the effect of an antidumping policy is to increase
the second-period price in the home market. The home country's welfare declines in the second period, which implies that it declines overall. Under these conditions, an antidumping policy also lowers the foreign country's welfare by reducing its export profits in the second period. We conclude as follows:

Proposition 6: Assume that costs are constant over time, and that the foreign firm has a cost advantage in serving the home market. Let k < (K+P*rn)/2. An antidumping policy either leads to the welfare results in Proposition 5, or it lowers welfare in both countries. As k �~� r, an antidumping policy necessarily lowers welfare in both countries.

We can use this last example, where the home firm is at a slight cost disadvantage, to illustrate the importance of antidumping policy to the entry decisions of firms. Since antidumping duties can override any innate cost advantage possessed by the foreign firm, an antidumping policy may create a profit opportunity for the home firm that induces entry.

foreign firm instead sets its local price at P*rn in the first period. Thus, the expre •• ion , II*l(p*rn) - II*l(p*1T)' describes the minimum gain in first-period profits that arises if the foreign firm foregoes its second-period cost advantage. As k �~� K+, II*l(P*rn) - II*l(P*1T) �~� II*l(P*rn) > 0 [since, as
k �~� K+, P*lT �~� rand II*l(p*1T) - (P*lT-K)D(P*1T) �~� 0+]. However, by foregoing its cost advantage, the foreign firm loses profits in the second period. The maximum loss in second-period profits equals II 2 (k,K) (k-K)d(k). As k �~� K+, II 2 (k,K) �~� O. Hence, as k �~� K+, the best strategy is to forego the second-period cost advantage.
21

Once again, let k > K. Let each firm incur the same entry cost, f,
and assume that (k - K)dt(k) > f [where dt is the home country's demand function in period t]. Consider a game where firms make simultaneous entry decisions after the policymaker commits to 8. In an equilibrium without an antidumping policy [i. e., 8 - 0], only the foreign firm enters the home market. If the home firm also enters, then Bertrand price competition causes
price to fall to k. The home firm loses f overall, while the foreign firm
still earns (k - K)dt(k) > f in each period. Equilibcium behavior requires
that the foreign firm act a0 0 11.1 207.82 570.97 Tm4 208.66 524.16 Tm 1.2957 0

The above analysis shows that when the foreign firm has a relatively small cost advantage, an antidumping policy causes that firm to serve the entire home market in one period, and then disappear due to high dumping duties in the next period. If the game consists of more than

Bertrand competition with imperfect substitutes, it can be readily shown that an antidumping policy raises the foreign export price and lowers the foreign local price in the first period.31 This behavior serves to reduce any future antidumping duties. Since prices are strategic complements under typical demand assumptions, the increase in the foreign export price induces the home firm to raise its price in the first period. This action by the home firm increases foreign export profits, thereby improving the foreign country's

for the home firm to act strategically. The home firm's output increases in the first period because the foreign firm raises

Appendix

Consider the imposition of an antidumping policy in a three-period game. We assume that demand and cost conditions are stable across periods; hence, the profit functions remain unchanged over time. We express the home firm's profit function in period t as �~�t� - �~�o�.� Similarly, the foreign firm's export profits are nt - no and its local profits are n*t - n*o in period t. Finally, we assume that k > K, and examine behavior as k �~� K+.
Since k > K, the foreign firm has a cost advantage in period 1. If
the foreign firm has a cost advantage in period 2, [i.e., k > K + sl' where Sl - max(O'P*1-P1)]' then the foreign firm will set its second-period prices so that it foregoes its cost advantage in period 3 [see footnote 28]. Given this result, the foreign firm's strategy can be analyzed in terms of three possibilities relating to its cost advantage in its export market:
(a) maintain a cost advantage in period 1 only, (b) maintain a cost advantage in periods 1 and 2, and (c) maintain a cost advantage in periods 1 and 3. We show that (a) dominates (b), and that (c) dominates (a). Hence, (c) is the best strategy.
Under strategy (a), the foreign firm does not constrain its local
price in order to maintain a cost advantage in periods 2 and 3. Hence, the foreign firm sets its local price at the

in period 3. Hence, strategy (c) dominates strategy (a). It can be readily shown that as k �~� K+, the foreign firm's local price approaches P*M in all three periods.

References

Brander, James A. and Krugman, Paul R., "A 'Reciprocal Dumping' Model of International Trade," Journal of International Economics, November 1983,
12., 313-322.

Brander, James A. and Spencer, Barbara J. "Tariff Protection and Imperfect Competition," in H. Kierzkowski, ed. , Monopolistic Competition and International Trade, Oxford: Clarendon Press, 1984, 194-206.

Davies, Stephen W. and McGuinness, Anthony J., "Dumping at Less than Marginal Cost," Journal of International Economics, February 1982, il, 169-182.

Dixit, Avinash K., "Anti-Dumping and Countervailing Duties under Oligopoly," European Economic Review, 1988, 1l, 55-68.

Eaton, Jonathan and Grossman, Gene M., "Optimal Trade and Industrial Policy under Oligopoly," Ouarter1y Journal of Economics, May 1986, 101, 383-406.

Ethier, Wilfred J., "Dumping," Journal of Political Economy, 1982, 90, 487-506.

_______ , Modern International Economics, New York: W.W. Norton, 1983.

Fischer, Ronald D., "Endogenous Probability of Protection and Firm Behavior," mimeo, University of Virginia, 1990.

Gruenspecht, Howard K., "Dumping and Dynamic Competition," Journal of International Economics, February 1988, 25, 225-248.

Haber1er, Gottfried von, The Theory of International Trade with its Applications to Commercial Policy, New York: Macmillan, 1937.

Lahiri, Saja1 and Sheen, Jeffrey, "On Optimal Dumping," Economic Journal, Conference 1990, lQQ, pp. 127-136.

Prusa, Thomas J., "Antidumping Law and Firm Behavior, " mimeo, SUNY-Stony Brook, 1991.

Staiger, Robert W. and Wolak, Frank A., "Strategic Use of Antidumping Law to Enforce Tacit International Collusion," mimeo, Stanford University, 1991.

Vakerics, Thomas V., Wilson, David I., and Weigel, Kenneth G., Antidumping. Countervailing Duty. and Other Trade Actions, New York: Practising Law Institute, 1987.

Viner, Jacob, Dumping: A Problem in International Trade, Chicago: University

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of Chicago Press, 1923.

Wares, William A., The Theory of Dumping and American Commercial Policy, Lexington: D.C. Heath, 1977.

Yntema, Theodore The
Economy147 14.67m08 Tc 4.887 0 Td.0December 1928, 36,