A Welfare Evaluation of Anti-Dumping Rules

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Abstract

The paper constructs a general equilibrium environment where firms find it profitable to set low prices abroad in order to 'dump' their products overseas. The paper conducts a welfare evaluation of implementing anti-dumping policies for two common interpretations of dumping activities: pricing below the cost of production and pricing abroad lower than at home. The major findings are: (a) in a world economy where firms play a price game in all markets, the anti-cost dumping policy is superior to the anti-price dumping policy for generating a welfare improvement for the injured country. (b) There is a special case where the imposition of anti-dumping rules can be welfare improving in all countries.

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1. Introduction

With the worldwide decline in explicit trade barriers, the imposition of countervailing duties against foreign firms became a major tool for protecting declining industries. Firms in the U.S. and Europe are allowed to petition to their governments for implementing import restrictions against foreign firms that are found selling at low prices (dumping) thereby injuring the domestic competing industries. While it is logically hard to understand why selling at low prices can be harmful, the General Agreement on Tariff and Trade classifies dumping as an injuring activity.

The logic behind the definition of dumping as a trade barrier is not completely clear and obviously this paper does not provide a complete answer to this fundamental question. However, this paper has four goals: (a) To construct a general equilibrium model where firms play price games in all markets in order to examine whether anti-dumping rules can be welfare improving for the injured counties and for the world. The importance of modelling the firms using prices as strategies is that if there is any meaning to the term 'dumping' it has to be precisely an action taken by a firm to lower the price abroad in order to expand its market share. That is, dumping is a price action! (b) To check the conditions under which the welfare of a country injured by dumping can be raised by the impositions of anti-dumping rules. (c) To compare the relative effectiveness of the two common types of anti-dumping rules. (d) To investigate whether anti-dumping rules can be welfare improving to all countries. That it, can an anti-dumping policy be (world) Pareto improving?

The paper classifies two types of dumping. In the first type, firms sell abroad at a price below cost of production (*cost-dumping*). The second interpretation of dumping is more popular among policy makers and involves firms selling abroad at a price lower than at home (*price discrimination dumping*). When conducting a welfare evaluation of anti-dumping policies it is important to distinguish between these two types of

dumping since they may reflect different strategic behavior of firms. Therefore, the present analysis concentrates on two interpretations of anti-dumping rules. (i) Firms are prohibited from selling their products overseas at a price below cost of production. (ii) Firms are prohibited from price discrimination by selling their product abroad at a price lower than they charge domestically.[1]

The paper develops a general equilibrium dynamic model in which firms selling differentiated products find it profitable to sell at 'low' prices in order to establish market shares. Market shares are important to firms since in this framework, production is subject to learning by doing where a higher initial production level reduces the production cost in a subsequent period.

In the literature, there have been only few attempts to explain the existence of international dumping and to evaluate the welfare consequences of dumping activities and anti-dumping rules. Brander and Krugman (1983) and Dixit (1988) provide analyses of dumping in imperfectly competitive environments where firms are using quantities as the strategic variables. Davies and McGuinness(1982), Ethier (1982), Das (1982), and Hillman and Katz (1986) generate dumping under uncertainty. Gruenspecht (1988) and Dick (1991) generate dumping in a learning by doing environment where firms expand output in order to reduce future cost.

This paper adds to the literature in two major aspects. (a) Firms are modelled here as *price* setters, rather than quantity setters. While low prices may be a result of a large supply of goods, the very definition of dumping activity is that firms follow a low pricing strategy abroad. Thus, it is desirable to assess the welfare consequences of dumping by having firms playing price games rather than quantity games. (b) The

[1]The U.S. Commerce Department may label imports as cost-dumped goods if foreign companies make less than 8% profit on export sales. Also, it may label imports as price-dumped if the producer sells as little as 0.5% higher in foreign markets than it sells in America, *The Economist,* December 7, 1991, p56. Note that these figures should be treated with caution since they may compare wholesale, discount, and retail prices in different countries.

analysis here is conducted in a general equilibrium setting which better suits a welfare evaluation analysis. (c) The paper compares the (individual countries and the world) welfare consequences of the two common anti-dumping policies.

The paper is organized as follows. Section 2. sets up a two period two country two firm (cost) learning by doing general equilibrium model where one firm in one country has an initial cost advantage over the other. Section 3. analyzes the free trade subgame perfect equilibria and classifies two types of dumping activities. Section 4. analyzes the welfare consequences of establishing an anti-cost dumping rule (imposed by GATT on all countries). Section 5. analyzes the effects of imposing anti-price dumping rules. Section 6. compares the two policies and concludes.

2. A Learning by Doing Model and Market Shares

Consider a two period ($t = 1, 2$), two country world economy. The two countries are denoted by α and β. In each country there is one competitive consumer that buys one unit of a perishable product in each period.

2.1 Firms

In each country there is one firm capable of producing one brand of a differentiated product. The brand produced in country α is denoted by A, and the brand produced in country β is denoted by B. Let $q_t^{A,k}$ and $q_t^{B,k}$ denote the quantities sold of products A and B in country $k = \alpha, \beta$, respectively. Also, let $q_t^A \equiv q_t^{A,\alpha} + q_t^{A,\beta}$ and $q_t^B \equiv q_t^{B,\alpha} + q_t^{B,\beta}$ denote firms' A and B period t production levels, respectively. Production cost of each firm exhibits dynamic learning by doing. Let c_t^k denote the period t unit production cost of the firm located in country k, $k = \alpha, \beta$. We assume that $c_1^\alpha = c^\alpha$ and $c_1^\beta = c^\beta$ are given, and that the second period unit costs depend on the first period scale of

production. More precisely, assume that for $k = \alpha, \beta$,

$$c_2^k = \begin{cases} c^k - m & \text{if } q_1^k \geq 1 \\ c^k & \text{otherwise} \end{cases} \tag{1}$$

where m is the cost reduction parameter resulting from a learning achieved via a minimum first period production level (which equals in our case the population size of each country).[2] We assume that $c^k \geq m$ and,

Assumption 1 *Country β has the initial cost advantage. Formally, $c^\alpha > c^\beta$.*

Assumption 2 *If learning by doing occurs in country α only, the period $t = 2$ cost advantage shifts in favor of country α. Formally, $c^\alpha - c^\beta < m$.*

Denote by $p_t^{A,k}$ and $p_t^{B,k}$ for $k = \alpha, \beta$, $t = 1, 2$ the period t prices set by firms A and B in country k. Also, if firms do not price discriminate between countries, we denote these prices by p_t^A and p_t^B. The two firms play a price game, where in each period firms set the prices at home and abroad to maximize their two period profits given by

$$\pi^\alpha \equiv \sum_{t=1}^{2} \left[(p_t^{A,\alpha} - c_t^\alpha) q_t^{A,\alpha} + (p_t^{A,\beta} - c_t^\alpha) q_t^{A,\beta} \right], \text{ and } \pi^\beta \equiv \sum_{t=1}^{2} \left[(p_t^{B,\alpha} - c_t^\beta) q_t^{B,\alpha} + (p_t^{B,\beta} - c_t^\beta) q_t^{B,\beta} \right], \tag{2}$$

Thus, the strategies of firms A and B are the quadruples $\{p_t^{A,\alpha}, p_t^{A,\beta}\}_{t=1}^2$ and $\{p_t^{B,\alpha}, p_t^{B,\beta}\}_{t=1}^2$, respectively.

2.2 Consumers

Consumers buy one unit of the product either from the home firm or from the foreign firm. We model here a new product in which the consumer in each country places a lower first period value on the foreign product compared with the home product.

[2]For simplicity, we assume only one threshold quantity level of output for learning by doing.

Note that this assumption is essential for generating price discrimination dumping. Formally, the lifetime welfare of country k's consumer, $k = \alpha, \beta$ is

$$W^k = \sum_{t=1}^{2} \left(\pi_t^k + u_t^k \right) \tag{3}$$

where,

$$u_1^k = \begin{cases} -p_1^{j,k} - s & \text{buys foreign in } t = 1 \\ -p_1^{i,k} & \text{buys domestic in } t = 1 \end{cases} \quad \text{and } u_2^k = \begin{cases} -p_2^{j,k} & \text{buys foreign in } t = 2 \\ -p_2^{i,k} & \text{buys domestic in } t = 2 \end{cases}$$

where i denotes the domestically produced brand (i.e., $i = A$ and $j = B$ if $k = \alpha$, and $i = B$ and $j = A$ if $k = \beta$). Thus, the parameter $s \geq 0$ represents the product differentiation ('penetration') parameter in which a foreign firm has to 'compensate' the consumer for 'trying' its brand in the first period. There are two additional interpretations to the parameter s: Given that the two brands are of the same quality, s can be thought of consumers' transportation cost (or transportation disutility), or it can be interpreted as the cost or disutility of obtaining service overseas.[3]

3. Equilibrium Under Free Trade

We analyze subgame perfect equilibria in the above strategies, where the payoffs to firms are defined in (2).

3.1 The second period

The second period prices and quantities depend on first period output levels of both firms. There can be only three possible equilibrium outcomes in the first period: (i) Only the firm in β sells in both countries ($q_1^A = 0$ and $q_1^B = 2$), (ii) both sell at their base country ($q_1^A = q_1^B = 1$), and (iii) only the firm in country α sells in both countries ($q_1^A = 2$ and $q_1^B = 0$). The second period prices and profit levels are given in table 1.

[3]For simplicity, we assume that this differentiation parameter applies only to the first period purchase. However, there is no reason to assume why it cannot apply for the second period as well. Also, note that assuming $s < 0$ could generate 'reverse dumping,' see Flam (1987).

$t=1$ *production*	$t=2$ *price*	$t=2$ *production*	$t=2$ *profit*
$q_1^A=0,\, q_1^B=2$	$p_2^B=c^\alpha$	$q_2^A=0,\, q_2^B=2$	$\pi_2^B=2(c^\alpha-c^\beta)+2m$
$q_1^A=q_1^B=1$	$p_2^B=c^\alpha-m$	$q_2^A=0,\, q_2^B=2$	$\pi_2^B=2(c^\alpha-c^\beta)$
$q_1^A=2, q_1^B=0$	$p_2^A=c^\beta$	$q_2^A=2,\, q_2^B=0$	$\pi_2^A=2(c^\beta-c^\alpha)+2m$

Table 1: *Second period equilibrium prices and profit levels*

The table follows directly from the cost structure (1), and the assumption that the products are not differentiated in $t=2$. In the first case, only B is sold in both countries in $t=1$, and hence only the firm in β learns and its cost is reduced by m. Therefore, in $t=2$ firm B can undercut firm A by setting a price of $p_2^B=c^\alpha$. In the second case, both produce in $t=1$, and since the cost difference does not change with the learning by doing, firm B undercuts A by setting $p_2^B=c^\alpha-m$ in period $t=2$. In the third case, firm A is the only producer in $t=1$. Assumption 2 implies that its cost improvement shifts the advantage in its favor thereby undercutting firm B by setting $p_2^A=c^\beta$ in $t=2$.

3.2 The first period

Under free trade, the competition over market shares induces firm B to undercut A in both countries. In order to do that, firm B has to set prices in each country that satisfy three conditions:

$$p_1^{B,\alpha}\leq c^\alpha-s,\;\; p_1^{B,\beta}\leq c^\alpha+s,\;\; \text{and } p_1^{B,\alpha}+p_1^{B,\beta}\leq 4c^\alpha-2c^\beta-2m \tag{4}$$

The first constraint implies that firm B has to set the price below A's cost of production minus α's consumer disutility from buying foreign. The third constraint is on the sum of the prices (also, revenues in our case). The sum of the prices has to be low enough to prevent firm A from undercutting B in both countries at the same time. By assumption 2, such undercutting will create a second period cost advantage in favor of

firm A. To show that observe that if firm A undercuts B in both countries, by setting $p_1^{A,\alpha} = p_1^{B,\alpha} + s$ and $p_1^{A,\beta} = p_1^{B,\beta} - s$ then

$$\pi^\alpha = (p_1^{B,\alpha} + s) + (p_1^{B,\beta} - s) - 2c^\alpha + 2(c^\beta - c^\alpha) + 2m \leq 0,$$

where the inequality follows from the third constraint in (4).

Table 1 reveals that firm A may benefit more by undercutting firm B in both countries instead of country α only. This is simply because firm A can never achieve a cost advantage in $t = 2$ if it produces in country α only in $t = 1$. Thus, if the third constraint in (4) is satisfied, it is possible to find (non-unique) $p_1^{B,\alpha}$ and $p_1^{B,\beta}$ that would also satisfy the first two constraints. Therefore, we need the following assumption.

Assumption 3 *If a firm does not benefit from price discrimination between countries, it will set equal prices in both countries.*

Thus, assumption 3 and (4) imply that firm B sets the price in country α to satisfy $p_1^{B,\alpha} = \min\{c^\alpha - s; 2c^\alpha - c^\beta - m\}$. Therefore, the Nash equilibrium prices, profit levels, and country α's welfare are given in table 2.

parameter range	$p_1^{B,\alpha}$	$p_1^{B,\beta}$	π^β	W^α	W^β
$c^\alpha - c^\beta < m - s$	$2c^\alpha - c^\beta - m$	$2c^\alpha - c^\beta - m$	$6(c^\alpha - c^\beta)$	$-3c^\alpha + c^\beta + m - s$	$3c^\alpha - 5c^\beta + m$
$c^\alpha - c^\beta > m - s$	$c^\alpha - s$	$3c^\alpha - 2c^\beta - 2m + s$	$6(c^\alpha - c^\beta)$	$-2c^\alpha$	$2c^\alpha - 4c^\beta + 2m - s$

Table 2: *Free trade equilibrium outcomes, only firm B produces*

Figure 1 illustrates the free trade price discrimination equilibria in the $[m-(c^\alpha-c^\beta)]$ space. By assumption 1, the relevant area is confined to the areas below the diagonal $c^\alpha - c^\beta \leq m$, where in this entire area firm A is not producing in period $t = 1$ and hence not in $t = 2$. For a given initial cost difference, when m increases, beyond a certain point (i.e., in region II), $p_1^{B,\alpha}$ decreases and α's welfare (the injured country)

increases. Thus, a high m implies a stronger learning by doing effect, and hence stiffer competition which translates to very low prices that firm B sets in both countries to in order to deter firm A from undercutting in both markets. In region I there is a small learning by doing effect (low m) and hence firm B can secure both markets by price discriminating and setting a lower price in country α thereby pricing firm A out in both markets.

INSERT FIGURE 1

3.3 Dumping classifications

We now define two types of 'dumping' activities. The first type involves selling abroad below cost of production, and the second type involves price discrimination among countries.

DEFINITION 1 (Cost Dumping:) *Selling abroad at a price below cost of production. Formally, Country β is said to be cost dumping in country α in period 1 if $p_1^{B,\alpha} < c^{\beta}$. Similarly, country α dumps at β if $p_1^{A,\beta} < c^{\alpha}$.*

DEFINITION 2 (Price Dumping:) *Selling abroad at a lower price than at home. Formally, Country β is said to be dumping in country α in period 1 if $p_1^{B,\alpha} < p_1^{B,\beta}$. Similarly, country α dumps at β if $p_1^{A,\beta} < p_1^{A,\alpha}$.*

In terms of figure 1, price dumping occurs when $c^{\alpha} - c^{\beta} > m - s$. In this case, due to the initial high cost difference together with a relatively low learning cost reduction parameter, firm B can capture both markets by price discrimination with a lower price in country α. When $c^{\alpha} - c^{\beta} < m - s$, the competition between the two firms is intense and firm B substantially lowers the price in both countries in order to capture both markets, so that α's market is captured without price discrimination.

4. Anti Cost Dumping Policy

Suppose now that GATT enacts a rule in all countries that firms are forbidden from selling abroad at a price below their (current) cost of production.[4] That is, $p_1^{B,\alpha} \geq c^\beta$ and $p_1^{A,\beta} \geq c^\alpha$. It turns out that there are two cases depending on whether the initial cost difference exceeds the differentiation parameter s. If it does, B can profit from undercutting A in α by setting $p_1^{B,\alpha} = c^\alpha - s (> c^\beta)$ (and $p_1^{B,\beta} = c^\alpha + s$ in country B). Therefore, if $c^\alpha - c^\beta > s$, firm B sells in both countries and the Nash equilibrium prices, profit and welfare levels are given in the first row of table 3.

parameters	$p_1^{A,\alpha}$	$p_1^{B,\alpha}$	$p_1^{B,\beta}$	π^α	π^β	W^α	W^β
$c^\alpha - c^\beta > s$	n/a	$c^\alpha - s$	$c^\alpha + s$	0	$4(c^\alpha - c^\beta) + 2m$	$-2c^\alpha$	$2c^\alpha - 4c^\beta + 2m - s$
$c^\alpha - c^\beta < s$	$c^\beta + s$	n/a	$c^\alpha + s$	$c^\beta + s - c^\alpha$	$3(c^\alpha - c^\beta) + s$	$-2c^\alpha + m$	$c^\alpha - 3c^\beta + m$

Table 3: *Anti-cost dumping policy*

However, when $c^\alpha - c^\beta < s$ (the differentiation parameter is large relative to the initial cost difference), firm A can capture the market in country α by setting $p_1^{A,\alpha} = c^\beta + s$. The equilibrium values are displayed in the second row of table 3. Figure 2 illustrates that firm A produces whenever $c^\alpha - c^\beta < s$. Not surprisingly, the anti-cost dumping rule generates a parameter range where firm A maintains a market share in country α in $t = 1$.[5]

INSERT FIGURE 2

A simple comparison of the welfare levels in tables 2 and 3 reveals the following.

[4] The same results are achieved if we allow governments to impose countervailing duties which would induce the seller to raise the price abroad. The same comment applies to the anti-price discrimination policy of the next section.

[5] It is observed that anti-dumping policies can 'price-out' foreign firms from the market. For the Japanese, Venezuelan and Mexican cement cases in the U.S. see *The Economist*, November 2nd 1991.

Proposition 1 *1. If the initial cost difference parameter is lower than the differentiation parameter (i.e., $c^\alpha - c^\beta < s$, regions III & IV in fig. 2), then the anti-cost dumping policy enables the entry of the injured firm A and improves the welfare of the injured country (α).*

2. If the initial cost difference parameter is higher than the differentiation parameter (i.e., $c^\alpha - c^\beta > s$, regions I & II in figure 2), then the anti-cost dumping policy does not provide a protection to the injured firm (A) and can only reduce the welfare of country α.

Thus, the anti-cost dumping rule provides a useful protection to country α when the initial cost difference is low. Note that in region II of figure 2, the anti-cost dumping rule reduces the welfare of the injured country (α) and increases β's welfare for a very simple reason: since the cost difference is high, firm B can still undercut firm A even with the protection of the anti-cost dumping rule. However, this policy raises the price of B in country α, thereby making α's consumers worse off.

5. Anti-Price Discrimination Dumping Policy

Suppose now that GATT enacts a rule for all countries that firms are forbidden to sell abroad at a price lower than the price which they charge domestically. That is, $p_1^{A,\beta} \leq p_1^{A,\alpha}$, and $p_1^{B,\alpha} \leq p_1^{B,\beta}$. Thus, in equilibrium each firm raises its domestic price and equates it to its export price.

5.1 Products are Differentiated: $s > m$

When price discrimination is prohibited, firm B may find it profitable not to lower its (common) price in order to sell in country α. Hence, an equilibrium where both firms sell domestically is characterized by: For a given p_1^A, firm B sets p_1^B such that firm A could not increase its profit by undercutting firm B in country β (i.e., by setting

$p_1^A = p_1^B - s$). Formally, for a given p_1^A, p_1^B has to satisfy

$$2(p_1^B - s) - 2c^\alpha + 2(c^\beta - c^\alpha) + 2m \leq p_1^A - c^\alpha$$

Similarly, for a given p_1^B, firm A sets p_1^A such that

$$2(p_1^A - s) - 2c^\beta + 2(c^\alpha - c^\beta) + 2m \leq p_1^B - c^\beta + 2(c^\alpha - c^\beta)$$

Solving the two equation yields the first column of table 4.[6]

5.2 Low Differentiation: $s < m$

In this case firm B lowers its (single) price to capture both markets by setting

$$p_1^B \leq \min\{c^\alpha - s\ ; 2c^\alpha - c^\beta + s - m\}$$

where the first item is the maximum price that would leave firm A out of market α and the second is the price which would prevent firm A from undercutting firm B in both markets at the same time.[7] Hence, the equilibrium values are displayed in the second and third columns of table 4.

[6] It has to be shown that at these Nash equilibrium prices, consumers would choose to buy only the domestically produced brands. That is, $-p_1^A > -p_1^B - s$ and $-p_1^B > -p_1^A - s$. It can be shown that both conditions are satisfied by assumption that $0 < c^\alpha - c^\beta < m < s$.

[7] If firm A undercuts B in both markets, $\pi^\alpha = 2(p_1^B - s) - 2c^\alpha + 2(c^\beta - c^\alpha) + 2m \leq 0$.

	$s > m$	$s < m$ and $c^\alpha - c^\beta < m - 2s$	$s < m$ and $c^\alpha - c^\beta > m - 2s$
p_1^A	$c^\alpha + 2(s-m)$	n/a	n/a
p_1^B	$2c^\alpha - c^\beta + 2(s-m)$	$2c^\alpha - c^\beta + s - m$	$c^\alpha - s$
π^α	$2(s-m)$	0	0
π^β	$4(c^\alpha - c^\beta) + 2(s-m)$	$6(c^\alpha - c^\beta) + 2s$	$4(c^\alpha - c^\beta) + 2(m-s)$
W^α	$-2c^\alpha + m$	$-3c^\alpha + c^\beta - 2s + m$	$-2c^\alpha$
W^β	$c^\alpha - 3c^\beta + m$	$3c^\alpha - 5c^\beta + s + m$	$2c^\alpha - 4c^\beta + 2m - s$

Table 4: *Anti-price dumping policy*

Figure 3 illustrates the welfare consequences of imposing the anti-price discrimination dumping rule.

INSERT FIGURE 3

Proposition 2 *1. If the learning cost reduction parameter is smaller than the differentiation parameter (i.e., $m < s$, region I in figure 3), then the anti-price discrimination policy allows entry of the injured firm A and improves the welfare of the injured country.*

2. If the learning cost reduction parameter is larger than the differentiation parameter (i.e., $m > s$), then the anti-price dumping policy does not improve the welfare of the injured country and improves the welfare of the dumping country (β). For a very high cost reduction parameter m (region III & IV in figure 3) this policy harms the injured country.

The intuition here is that for a very high cost learning reduction parameter, under free trade the injured country benefits from intense competition, which translates into a very low first period price. Since the competition is over all markets, this first period price reduction generates a high first period welfare level which dominates the second

period low welfare level resulting from a second period high price. Thus, in this case this anti-dumping rule can only harm the injured country.

Finally, the high cost reduction parameter case reveals a very interesting effect of the anti-price dumping policy. By taking the limit $s \to 0$, brands A and B become homogeneous products which eliminates the free trade firm B's price discrimination. In terms of figure 3, the right-most area is now the entire parameter range implying that the anti-dumping price policy necessarily harms the injured country, even if there was no price discrimination before the intervention. Thus,

Proposition 3 *The anti-price dumping policy can have an effect on the strategic behavior of firms even if it is implemented when firms do not price discriminate under free trade.*

Clearly, when m is large, this policy can only raise the prices and profits of the dumping country (β).

6. Conclusion: A Comparison of the Two Anti-Dumping Policies

This short paper demonstrates that anti-dumping rules have the potential of improving the welfare of the injured country in a world economy where firms use price strategies to dump their products abroad. The model developed in this paper is very simple, but it turns out to be very general in generating many direct and indirect consequences of the imposition of anti-dumping rules.

Figure 4 illustrates that the parameter range where the anti-cost dumping policy is welfare improving for the injured country (regions I, II, III, & IV) includes all the parameter range (regions I & II) where the anti-price dumping policy improves the welfare of the injured country. Therefore,

INSERT FIGURE 4 ABOUT HERE

Proposition 4 *The anti-cost dumping policy is superior to the anti-price discrimination dumping policy if the goal is to improve the welfare of the injured country. The anti-price discrimination dumping policy is superior to the anti-cost dumping policy if the goal is to improve the welfare of the dumping country.*

Thus, in general, if the purpose of GATT is to protect the injured country, the cost definition of dumping provides a better protection than the price discrimination definition. This can be explained as follows: In the case where the initial cost difference is small ($c^\alpha - c^\beta < s$), the anti-cost dumping provides the necessary protection to the injured country, since it enables it to produce in period $t = 1$. Thus, the anti-cost rule is relatively efficient since it generates the entry of the injured firm only when this entry has the potential of improving the welfare of the injured country (i.e., when the initial cost difference is small). This is not the case for the anti-price discrimination rule. In region IV (see also the second column of table 4), the anti-price rule does not enable the injured firm to enter, although the initial cost difference is small. This policy causes a welfare reduction for the injured country, since it enables the dumping firm to raise prices in all countries (note that this policy also weakens the ability of the injured country to undercut abroad). Since in this case the free trade competition is very intense, the injured country loses from implementing this policy. In summary, the anti-price discrimination dumping rule may reduce the competition faced by the dumping firm and enables it to raise prices in both countries without being undercut.

So far we have asked whether the anti-dumping rules can increase the welfare of a single country (either the injured or the dumping country), but we have not yet given any justification for these rules from a world welfare point of view. An rather surprising result of this paper is that there is a case where the anti-dumping rules can improve the welfare of *all* countries.

Proposition 5 *When the initial cost difference is sufficiently low relative to the difference between the differentiation parameter and the cost learning parameter (i.e., $c^{\alpha} - c^{\beta} < s - m$, region I in figure 4), then both types of anti-dumping rules lead to a world Pareto improvement.*

The intuition behind this proposition is that a high differentiation parameter (disutility from buying foreign in the first period) eliminates the the injured country 's free trade welfare benefits from getting the foreign brand cheaper than the locally produced brand. Thus, the injured country's welfare increases with the imposition of anti-dumping rules. The benefit to the dumping country from the imposition of these rules comes from the fact that the entry of the injured firm eliminates the need for the dumping firm to subsidize the consumption of the injured country. Notice that for many types of products like electronic goods and cars, the differentiation parameter (s) is small. That is, consumers do not place a much lower value on imported goods compared with the domestically produced goods. Thus, this proposition demonstrates that for most types products there is no justification for GATT to impose anti-dumping rules if the goal is world Pareto improvement. For some types of products (mainly services or newly developed products) this proposition shows that protecting in the form of anti-dumping regulation can be Pareto improving.

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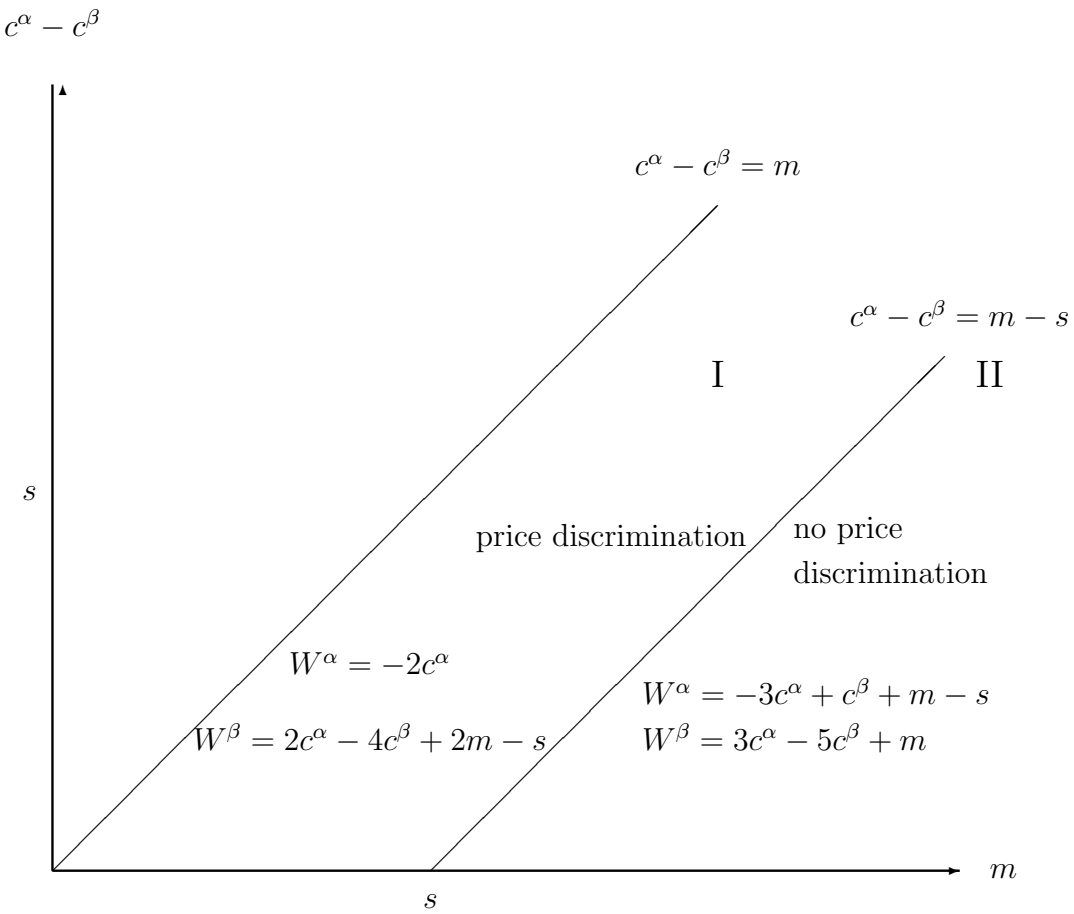

FIGURE 1: *Free trade, only firm B produces*

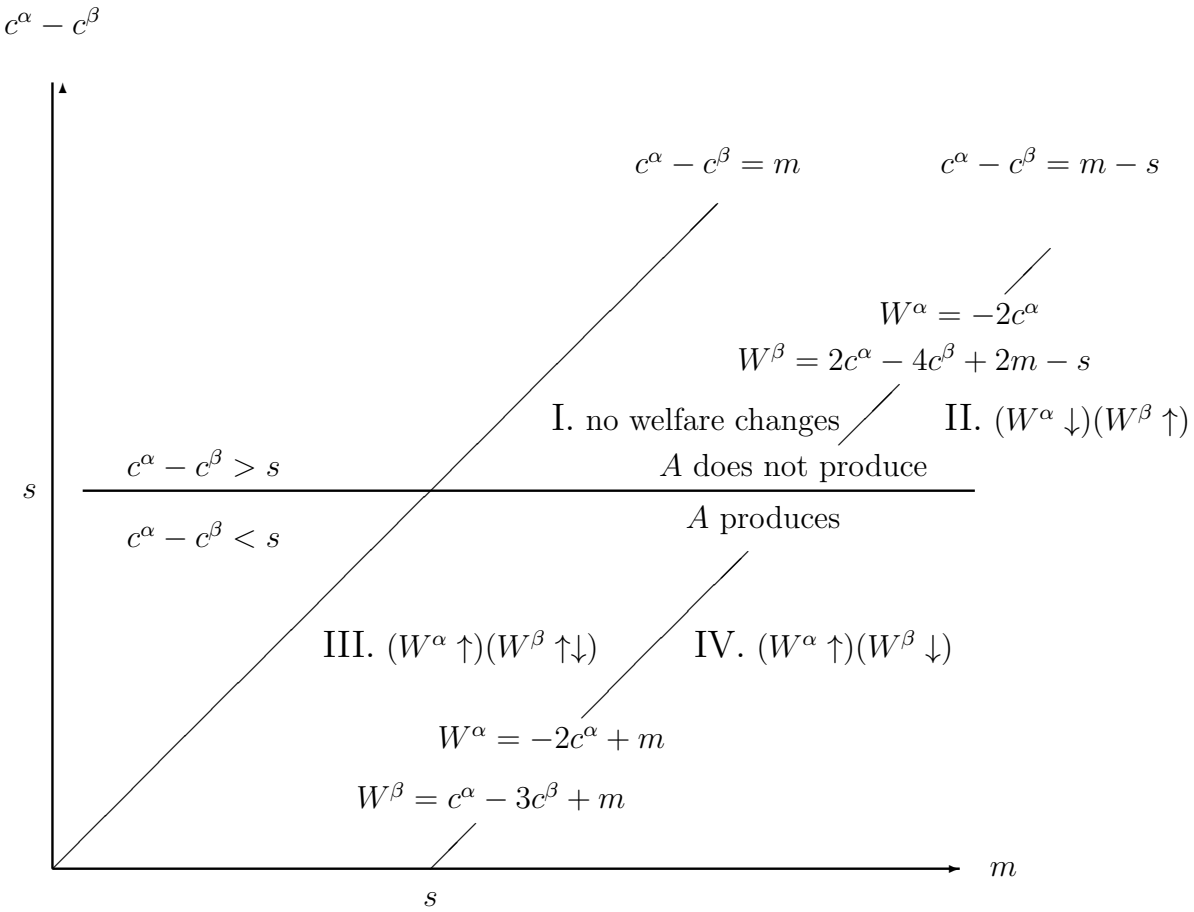

FIGURE 2: *Anti-cost dumping policy*

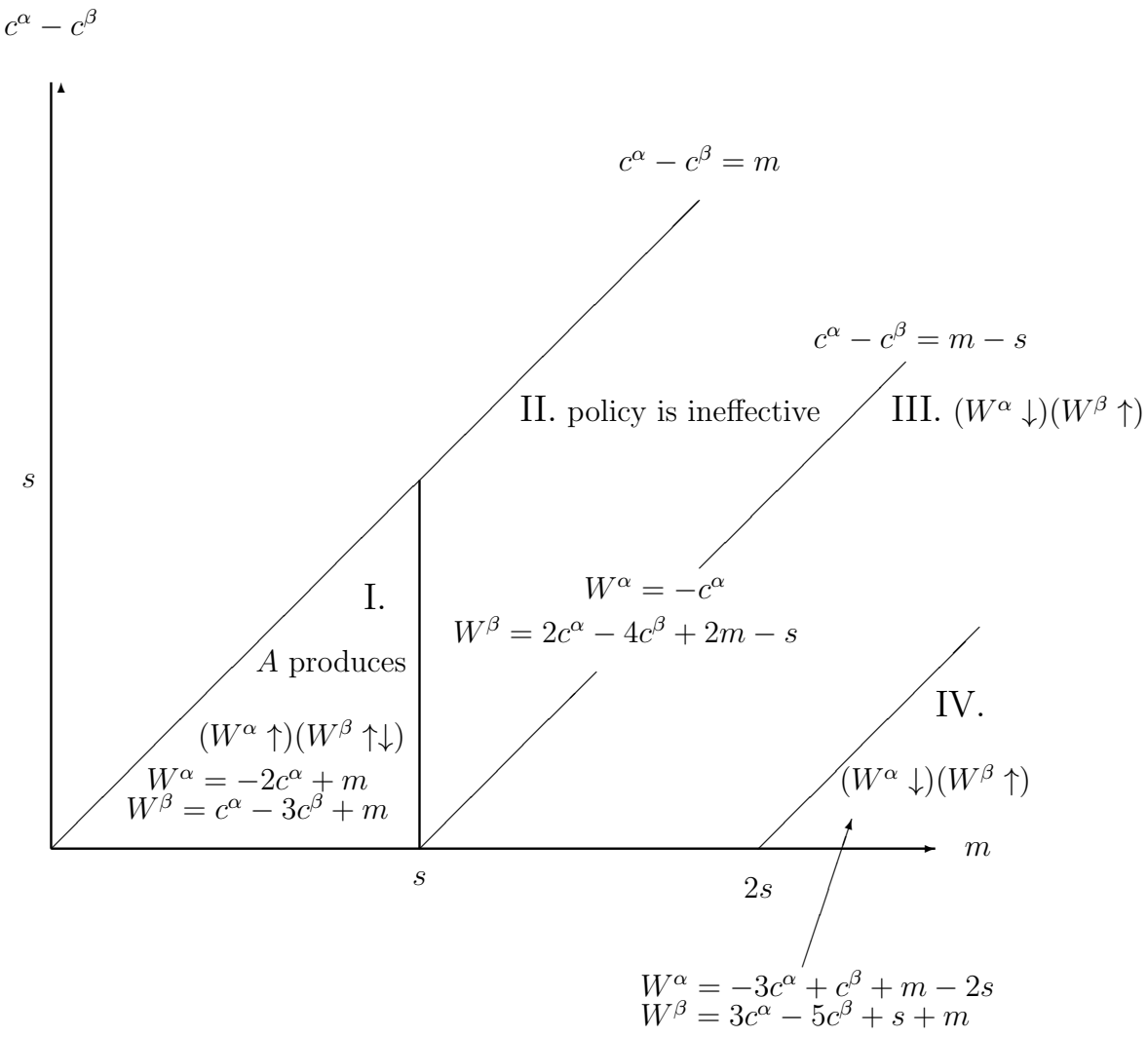

FIGURE 3: *Anti-price dumping policy*

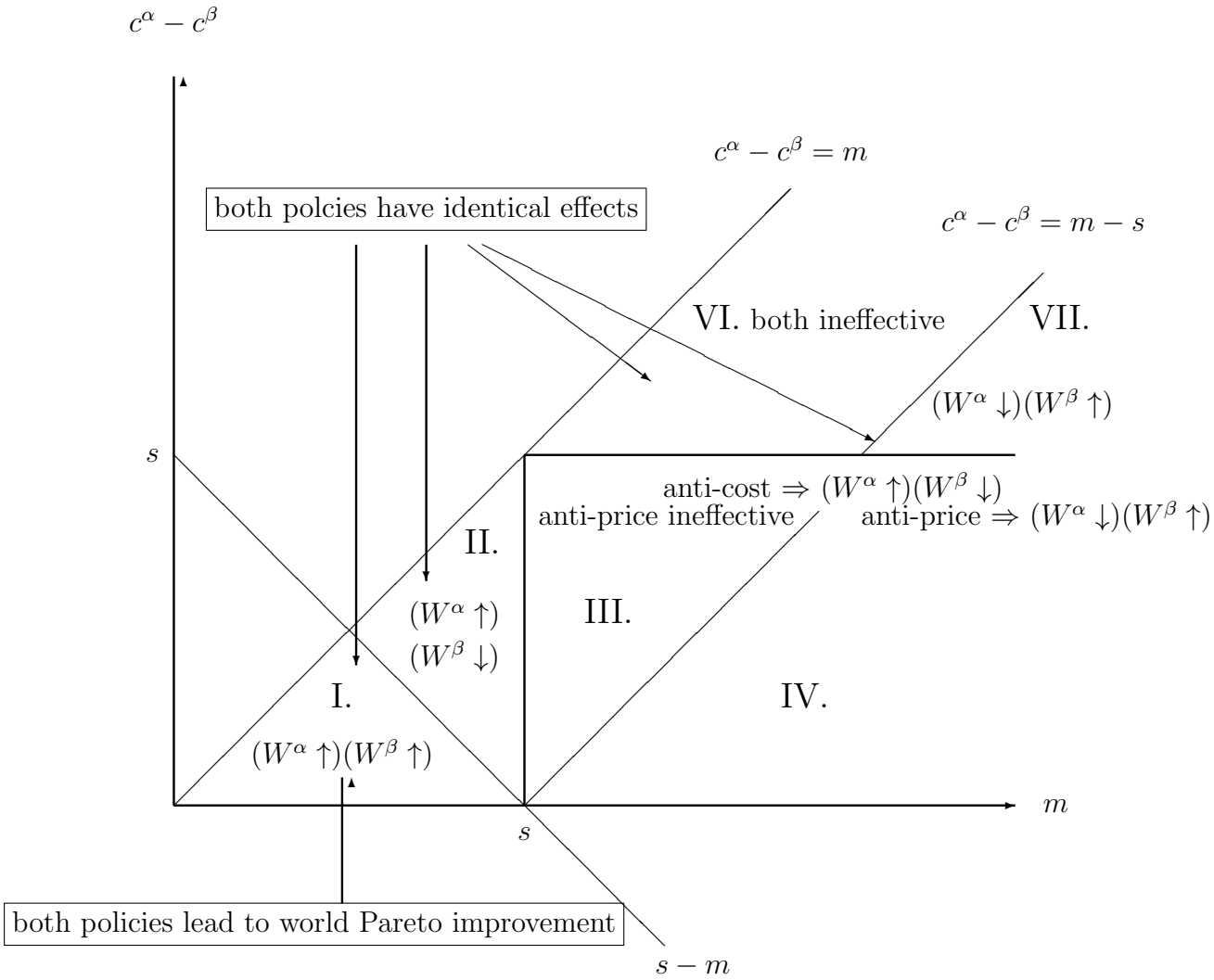

FIGURE 4: *Comparing the welfare effects of the two policies*