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Do Developing Countries Benefit from Antidumping Laws? An Assessment Based upon a Theoretical Dumping Model

MARIO D. TELLO¹

- **Resumen:** Este ensayo desarrolla un modelo de *dumping* internacional bajo mercados de competencia imperfecta donde las empresas explotan sus ventajas comparativas. El análisis de estática comparativa sugiere, primero, que bajo libre comercio y una política de competencia coordinada un producto con *dumping* puede aumentar el bienestar económico para el país importador bajo diversas estructuras de mercado de dichos productos. Estos beneficios surgen de precios importados más bajos y de un aumento de la competencia en el mercado doméstico. Segundo, en ausencia de estas políticas de competencia coordinadas entre países, el comercio de productos con *dumping* cuando los mercados de los productos son de competencia imperfecta sí puede producir pérdidas para el país importador. Tercero, el análisis de bienestar de instrumentos compensatorios al *dumping* indica que dichas medidas comerciales son las menos convenientes para el país importador. La mejor política es libre comercio acompañada de una política de competencia coordinada entre países. Cuarto, el modelo en adición permite identificar instrumentos alternativos que mejoran el bienestar del país importador de bienes comerciados con *dumping*.

1. Department of Economics, and senior researcher of Centrum Católica at the Pontificia Universidad Católica de Perú. This paper was finished when the author was visiting professor in the Department of Economics at Florida State University. The author thanks comments from an anonymous reviewer and to Alberto Isgut, Nicholas Schmitt, and Charles Sawyer for helpful comments on the first version of the paper. Needless to say any remaining errors are my own. E-mail: mtello@pucp.edu.pe. The mathematical appendix of this paper is available upon request from the author.

■ **Abstract:** This paper develops an international Dumping model of imperfect competition based upon developed and developing countries' comparative advantage. The main results of the analysis indicate: a) without trade impediments and a coordinated competition policy between trading countries, dumped products from foreign firms are beneficial for the dumped country under a broad range of market structures of these products because they increased social welfare. These benefits arise from cheaper imports and increasing competition in the domestic market; b) absence of a coordinated competition policy between trading countries may produce losses for the dumped country under imperfectly competitive markets; c) traditional antidumping duty suggested by the GATT not necessarily is welfare improving for the dumped country. Moreover, the welfare analysis suggests that antidumping tariffs are the least convenient trade policy for the dumped country. The first best policy is free trade together with a coordinated competition policy between countries; d) the model allows to identify alternative second best instruments for dumped countries.

■ **Key words:** Dumping, antidumping tariffs, international imperfectly competitive markets, social welfare.

■ **JEL code:** F12, L13, I31.

■ *Introduction*

Antidumping measures were created under the GATT in 1948 and applied in practice in 1958. However, since 1980 up to mid 90s, the number of antidumping measures has been rising notably among countries (Finger, 1992; Krishna, 1997; Guasch-Rajapatirana, 1998; Miranda-Torres-Ruiz, 1998), in particular from developed or industrial countries such as the United States (Russell, 1999). On the other hand, in the last two decades Latin American as many developing (or less developed) countries (including economies 'in transition') have undertaken structural reforms including trade liberalization processes in order to pursue outward oriented and market based development strategies. For these 'newcomers' countries the problem that they are facing is threefold. One is to understand the meaning of dumping and antidumping measures in world with freer trade than before. Second, to understand the antidumping laws as suggested by the GATT and WTO. Third, to change their antidumping rules in order to be consistent to international rules.

The main purpose of this paper is to provide a partial equilibrium model of Dumping (based upon the comparative advantage between developed and developing countries) and wherein the optimal trade policy for the dumped or importer (developing) country can be assessed and applied in a simple way. The model complements the existing theoretical literature on the subject.

In the next section, a brief summary of the evidence of the international use of antidumping (for the period 1987-1997) from developing countries (including Latin America and economies in transition) is presented. Further, this section discusses briefly the relevant theoretical frameworks developed up to date. Section 3 describes the main features of the model. Section 4 describes the optimal commercial policy from the point of view of the dumped or importer developing country. The last section sums up the main findings of the paper. At the end, a Mathematical Appendix is presented wherein the complete and more general model is described.

■ *Dumping and antidumping laws in developing countries: evidence and theory*

According to WTO Secretariat sources 32% of the investigations reported by countries for the period 1987-1997 were from developing countries and economies in transition.² 66% of the investigations from developing countries came from Latin American countries; 3.5% from transition economies and 30.5% from the rest of developing countries. In these figures, there are no reported investigations to the WTO from 29 developing countries despite that these countries have notified to have antidumping legislation. Although LACs and the rest of developing countries are relatively new comers on dumping legislation,³ by the end of the 1980s, there is increasing trend of dumping investigations from these countries (Guasch-Rajapatirana, 1998). These figures show the importance of dumping legislation for developing and transitional countries. A second feature of the evidence reported by the WTO is that close to 40% of the dumping investigations reported by developing and transitional economies are against firms from developed coun-

2. Miranda-Torres-Ruiz, 1998; Guasch-Rajapatirana, 1998. The total of reported cases was 2196.

3. The traditional user countries are Australia, Canada, the EC (European Community), New Zealand and the United States.

tries; 31% are against from other developing countries and close to 30% against firms from transitional economies. Most of the reported investigations against transitional economies are against China. A third feature of the dumping investigations is that close to 86% are from the manufactured sector with relative high level of firms' concentration. Highly competitive industries such as Textiles, Footwear, and Leather represent less than 9% of the investigations reported by the WTO.

These features will be taken into account in the model presented in the next section. The dumped and importing country will be assumed to be a developing country and the dumping and exporting country will be assumed to be a developed country. A broad range of industrial configurations of relatively high level of firms' concentration will be assumed for the market of the dumped product in the developing country. The model will also analyze the case when the market is highly competitive.

Turning to the literature on dumping theory, this can be classified in four groups. One concentrated in the welfare effects and trade policies of the trading (dumping or exporting and dumped or importing) countries. A sample of the most relevant papers of this group is summarized in Table No. 1.⁴ The second group of papers deals with the positive analysis of dumping. These papers concentrate in the dumping equilibrium and its relationship with firms' behavior and the stages of the dumping legislation. Examples of these papers are Panagariya-Gupta (1998), Prusa (1994, 1992), Gupta (1997), Krugman-Brander (1983), Kurdle (1974), Staiger-Wolak (1992, 1994) among others. The third group found concentrates on the dumping evidence as reported by the WTO, the measure of the dumping effects as well as practical rules to deal with the problem. Examples of these papers are Galloway-Blonigen-Flynn (1999), Morkre-Kelly (1994), Khrisna (1997) and Murray-Rousslang (1989), Finger (1993) and Stiglitz (1997). The last group found includes survey and/or reflexive papers in relation to the WTO, GATT rules and competition policies. Examples of these are Willig (1998), Niels (2000), Finger (1992), and Horlick-Sugarman (1999).

The model presented in the next section belongs to the first group of papers. Within this group, according to Niels (2000), it can be distinguished two subgroups of models. *The traditional model* which assumes that the main source of trade is the comparative advantage of the trad-

4. Other papers not included in this table extend the analysis of these papers. For example, Schmitt-Anderson-Thisse (1995) analyzes the case of differentiated products.

ing countries. The main tool of analysis is a partial equilibrium framework. In these models, dumping is explained by the theory of price discrimination at the international level. Prices in the dumping and dumped countries are different because foreign firms segment markets which may have different demand price elasticity. Prices in both markets are non-predatory.⁵ Most of these models concentrate in the welfare and price effects of the product market of the dumping country since it is assumed that prices in the dumping country are those that arise from a perfectly competitive market structure. So that the welfare and price effects on these dumped countries are equivalent to the free trade equilibrium. Representative papers of this kind of models shown in Table No. 1 are the studies of Viner (1923), Harberler (1937), Robinson (1937), Yntema (1928) and Lofgreen (1977).

The second subgroup of models is what Neils (2000) calls the *modern theory of dumping* which was initiated in the 1980s. Although, some papers in this subgroup use a general equilibrium framework (e.g., Eicher 1982, and Clarida 1993) with trade explained by scale economies and imperfect competition (e.g., Gruenspecht, 1988), the majority of works are still based upon comparative advantage and use partial equilibrium framework. A major objective within the latter is the explanation of market prices in the dumped country below the unit or marginal production costs, i.e., predatory prices. In these models, the focus of the dumping analysis is on the welfare effect of the dumping foreign country. Nonetheless, there are some studies which analyze the dumping welfare effects in both countries (e.g., Anderson 1992 and 1993, and Clarida 1993).

There are two key differences between the traditional and modern theories. One is that in the modern theories, prices in the dumped market may be lower than the unit and/or marginal production costs of foreign firms even in perfectly competitive markets. Contrarily, in the traditional models those prices are higher than the unit or marginal cost of the foreign firms; that is, the modern literature of dumping mainly deals with predatory prices and the traditional with non-predatory prices. The second key difference is on the source of dumping.

5. In the sense that dumped prices are higher than the (unit or) marginal production cost of the foreign firms. In the standard predatory pricing literature, predatory prices (i.e., prices below unit or marginal production cost of firms) result from the strategic behavior of the firms to eliminate competition. In the dumping literature, these prices do not necessarily result from the strategic behavior of the firms. It may result from uncertainties in the market, prices and demand faced by firms.

In the traditional literature, imperfect markets together with the ability of foreign firms to discriminate between markets are the main sources of dumping. In the modern literature, dumping arise because of the existence of: a) uncertainty in the demand and/or market prices; b) the imposition of barriers to trade with risk neutral firms, and c) firms' dynamic cost considerations. In both subgroups of models there is a bias to analyze the welfare effects of dumping and trade policy from the point of view of the exporter or dumping country (see table 1).

The dumping model to be presented in the next section belongs to the first type of models. It complements the current literature because it analyzes the dumping welfare effect from the point of view of the importer or dumped country (and assumed developing). In a way, the model is a particular case of the ones developed by Dixit (1988), Collie (1991) and Eichengreen-der Ven (1984). However, there are some striking differences with those models. First, trade is based upon the comparative advantage of the countries and not upon the existence of scale economies internal to the firms and imperfect markets. Second, there is one exporting country, the foreign country. The importer country does not export the dumped product. Third, the results of the welfare and trade policy analysis are easy to apply and simple to understand for newly dumping institutions from developing countries. The Dixit, Collie and Eichengreen-der Ven papers were specifically designed, on the one hand, to justify partial countervailing duties under imperfect competitive markets and, on the other, to measure the welfare effects of the US antidumping measures in the steel industry.

Dumping is a relatively new phenomenon for developing and emerging economies that still are undertaking structural and trade reforms. Institutions that deal with this issue need simple rules and policies to intervene efficiently in the markets. Our model attempts to provide such rules and policies for the non-predatory dumping cases of price discrimination of foreign firms from developed countries under a broad range of industry configurations of the dumped product market in developing and transitional countries.

■ *A partial equilibrium model of dumping based upon comparative advantage*

Taking the main features found in the previous section and complementing the models based upon international imperfect competition and firms' price discrimination, the model to be developed in this section analyze the welfare effects of an antidumping policy from the point

TABLE 1
A survey of the theoretical approaches to dumping 1920-2000

<i>Author (year)</i>	<i>Key assumptions</i>	Dumped Country			Dumping Country			<i>Source of trade</i>	<i>Equilibrium framework</i>
		<i>Prices effects</i>	<i>Welfare effects</i>	<i>Prices effects</i>	<i>Prices effects</i>	<i>Welfare effects</i>	<i>Welfare effects</i>		
1. Viner (1923); Robinson (1933); Harberler (1937).	Monopoly/Perfect Competition and Price Discrimination	World Prices	Standard gains from trade	Higher Domestic Prices	Lower Gains from Trade	CA	Partial		
2. Yntema (1928); Lofgreen (1977)	Monopoly/Perfect Competition and Price discrimination	World Prices	Standard gains demand from trade	Depend on slopes of demand and costs	Depend on slopes of demand and costs	CA	Partial		
3. Ethier (1982)	Perfect Competition, Demand Uncertainty, firms are risk averse	Lower than Marginal Cost	Not Analyzed	Higher Domestic Prices than the world	Not Analyzed	CA	General		
4. Davies-McGuinness (1982)	Monopoly/Perfect Competition Price discrimination, dumping firms risk neutral and prices are random	Lower than marginal cost	Not Analyzed	May be lower or Higher than the world trade equilibrium	It could decrease or increase	CA	Partial		
5. Dixit (1988)	International Oligopolistic Markets; market segmentation	Lower Prices	Higher Gains from Trade	Lower Prices than autarky prices	Higher Gains from Trade	Comp. A	Partial		
6. Gruenspecht (1988)	International Oligopolistic Markets; two period; risk averse firms; market segmentation; learnings and experience effects	Prices may be lower than unit cost	Lower Gains from trade(respect to the autarky)	Symmetric results	Symmetric results;	Comp. A	Partial		

<i>Author (year)</i>	<i>Key assumptions</i>	Dumped Country		Dumping Country		<i>Source of trade</i>	<i>Equilibrium framework</i>
		<i>Prices effects</i>	<i>Welfare effects</i>	<i>Prices effects</i>	<i>Welfare effects</i>		
7. Lahiri-Sheen (1990)	Monopoly/Perfect Competition and Dumping Firms Price Discriminate. Dumping firms are risk neutral and foreign	Lower than marginal cost	Not Analyzed	Lower Domestic Prices than Autarky	Higher Gains from Trade	CA	Partial
8. Anderson (1992, 1993)	Perfect Competition, a positive probability of imposing a VER in a two period model, market segmentation	Lower than marginal cost	Depend upon: country size and probability of a VER	Not analyzed	Optimal policy may be an export tax or subsidy	CA	Partial
9. Clarida (1993)	Perfect competition, 2 countries, 2 period, 2 goods Ricardian Model, asymmetric information on production	lower than unit cost	Higher than the Autarky equilibrium	lower prices	Remains constant	CA	General

Source: elaborated by the author.

of view of the developing country. The model is an extension of the models developed by Tello (1995, 1993) and belongs to the family models of imperfect competition in international markets. Details of the general model is presented in a mathematical appendix available upon request from the author. This section describes the main features of the model.

It is assumed that there exist two countries and markets wherein a homogeneous product is traded⁶. The foreign developed country (dumping one) and the developing country (dumped). In trade equilibrium and in absence of any government intervention and coordinated international competition policies between both countries, a foreign firm sells its product to both the foreign and the domestic markets. At the autarky equilibrium, it is assumed that there exists a domestic firm which satisfies the whole market of the importing country. Before trade takes place, both firms are assumed to have monopoly power in their respective markets.⁷ When trade takes place, a new industry configuration is formed with these two firms selling in the domestic market of the dumped country. The industry configuration in the dumping country is assumed constant. The domestic market structure goes from a perfect competition to a Duopoly⁸ market structure with different firms' conjectural variations. Under the new domestic market structure, the foreign firm discriminates between the two markets.

The foreign firm's real marginal export production cost, which includes the shipment and insurance costs and a normal rate of the return of capital.⁹ It is represented by $cq^{*'}(q^*)$, $c'(q)$ is the real marginal production cost for the domestic firm, q^* is the exported quantity of the foreign firm to the domestic market and q is the output produced by the domestic firm. It is assumed that for any $q=q^* > qm$ then $cq^{*'} < c'$; wherein qm is a level of output much lower than the domestic consumption of the good.¹⁰ Also, it is assumed that both the foreign and domestic firms present upward function costs with slopes $cq^{*''}$

6. Alternatively, it can be assumed that the output produced by firms are similar with a high degree of substitutability.

7. Introducing more firms does not change the propositions that will arise from the model.

8. The assumed initial market structures and number of firms can be changed without changing the qualitative results.

9. This rate is defined as in Harberger (1954).

10. $qm > 0$ rules out the possibility that the domestic market be completely served by foreign firms for prices sufficiently low.

≥ 0 and $c'' \geq 0$ ¹¹. These assumptions on the marginal cost mean that the foreign firm has the comparative advantage on the production of the good (for $q^* \geq qm$) and that the domestic firm cannot export the product to the foreign country and market.

Let $p=D(Q)$ and $p^*=D^*(Q^*)$ be the domestic and foreign demand for each market respectively and p, p^* their respective consumer prices.¹² These two demands have at least two first derivatives and both are continuos. Moreover, their slopes are negatives. That is, $p' < 0$ and $p^{*'} < 0$, Q and Q^* are the consumption of the domestic and foreign markets respectively; Q^* is also the output sold by the foreign firm in the foreign market. When trade takes place $Q = q + q^*$. Total production cost of the foreign firm depends upon the two outputs q^* and Q^* i.e., the export output (q^*) and the output for the foreign market (Q^*). The cost function for the foreign firm is given by $C^*(q^*, Q^*) = C^*(q^*) + C^*(Q^*)$.¹³ The two markets trade equilibrium equations for the two firms that seek to maximize profits are:

$$(1) \quad \frac{d\pi^*}{dq^*} = q^* p' \left(\frac{dQ}{dq^*} \right) + p - cq^* = 0$$

$$(2) \quad \frac{d\pi^*}{dQ^*} = Q^* p^{*'} - cQ^* = 0$$

$$(3) \quad \frac{d\pi}{dq} = qp' \left(\frac{dQ}{dq} \right) + p - cq = 0$$

Wherein π, π^* are the profit functions of the domestic and foreign firms respectively; dQ/dq y dQ/dq^* are the respective conjectural variation for each firm (national and foreign). They indicate the change of the

11. In the general model described in the Mathematical Appendix, these cost assumptions are no longer necessary as long as the slope of the marginal cost in absolute terms is lower than the slope of the marginal revenue of the firms. This condition applies only for imperfect international markets.

12. In the absence of taxes these are the prices received by producers.

13. Assuming that this function does not have scope economies.

domestic demand (Q) when the output of the domestic and the foreign firm changes respectively; $dC^*/dQ^* = cQ^{*\prime}$ is the real marginal production cost of the foreign firm of the output sold in the foreign market (Q^*).¹⁴ At the equilibrium it is assumed that:

$$(4) \quad p^* \geq p \geq c'(q) \geq cQ^*(q^*)^{15}, \text{ for } Q = q^* + q$$

Under free trade and without any competition (or antitrust) policy at the national and international level, condition (4) means that the foreign firm is producing Dumping in the developing country's market.¹⁶ This Dumping occurs whenever: a) the foreign firm has a monopoly power in the foreign market and may also has it in the domestic market; b) the firm segments both markets; c) there exist a high and prohibitive transaction costs of reselling the products among countries (Phlips, 1983; Varian, 1989). Figure 1 shows the autarky and the trade dumping equilibrium in the developing country. To make matters simpler, marginal production costs in the figure are assumed constant for both firms. The DD curve represents the market domestic demand (compensated or Marshallian curve where is assumed that the income effect is negligible, Slesnick, 1998).

In autarky, the market equilibrium is represented by the allocation $E_m(Q_m, P_m)$. In this monopoly equilibrium, the monopolist's marginal revenue is given by:

$$(3)' \quad qp' + p = p(1 + z_0)^{-1}; \text{ where } (1 + z_0) = \left(1 + \frac{1}{\eta}\right)^{-1}; \text{ and } \frac{1}{\eta} = \frac{p'Q}{p}$$

It is the inverse of the price elasticity of the domestic market demand.

14. The difference between $dC^*(q^*, Q^*)/dq^* = cQ^{*\prime}$ and $dC^*(q^*, Q^*)/dQ^* = cQ^{*\prime}$ comes from the internal cost and the normal capital return from the industry and country. They would be equal if these two variables were equals.

15. Under the comparative advantage assumption of the foreign firm and the fact that the internal costs and the normal rate of return of capital in developing countries are higher than in developed countries, then in general, it is assumed that: $cQ^{*\prime} < cQ^{*\prime} \leq p \leq p^*$.

16. Condition (4) rules out, on the one hand, the possibility of predatory prices at the international level (Ordover-Saloner, 1989) and, on the other, that the Government from the foreign country may subsidize exports. Both are different distortions from the Dumping considered in the paper. Willig (1998) do consider these and other distortions as belonging to the Dumping category as defined in the rules of the GATT.

$w = q/Q$, is the domestic market share of the domestic firm. The inequality implies that $0 \leq \beta \leq 1$ and that the final mark-up (z) for the domestic firm is lower than the initial mark up (z_0). Note that, if $\beta=0$ then the domestic firm takes the price as given and $z_0=z=0$; if $\beta=1$; then the domestic firm is a monopolist in the domestic market; and if $\beta = w=q/Q$, then the domestic firm has a quantity Cournot conjectural variation. Analogously, β^* is the elasticity of the conjectural variation of the foreign firm and $z^* = (1 + \beta^*/\eta)^{-1} - 1$ is the mark-up of the foreign firm. Further, $0 \leq \beta^* = (q^*/Q)(dQ/dq^*) \leq 1$. Both definitions of β and β^* allows for different market structures at the dumping equilibrium, *Ed*. An alternative definition of the mark-up of a firm (v and v^* for the domestic and foreign firm respectively) is:

$$(5) \quad (p - c')/p = -\frac{\beta}{\eta} = v; \quad \frac{(p - cq^*)}{p} = -\frac{\beta^*}{\eta} = v^*$$

Using (4) we have that:

$$(6) \quad 0 \leq v = \frac{(p - c')}{p} \leq \frac{(p - cq^*)}{p} = v^*, \text{ or } \beta \leq \beta^*$$

The estimation of v^* as it will be shown below would provide information for dumping institutions' authorities in developing countries about the relevant trade policy instruments against the type of dumping analyzed in this paper. At the autarky equilibrium, the dumped country's social welfare is not maximized due to the distortion caused by domestic monopoly under the absence of foreign competition. The shaded area $E_m F' E_w$ measures the welfare loss of this equilibrium with respect to the trade equilibrium that would exist under free trade and a perfectly competitive market. The social welfare for the country at the autarky monopoly equilibrium is W_0 . At the free trade equilibrium with (domestic and foreign) firms behaving as in perfectly competitive markets, the dumped country will obtain the maximum gains from trade and its social welfare (W_{max}) would be:

$$(7) \quad W_{max} = W_0 + S;$$

S would be the monetary value of the shaded area $E_m F' E_w$ in the Figure 1. $E_w (Q_w, P_w)$ would be the market equilibrium of the dumped coun-

try when trade takes place and all firms behave as perfect competitive firms. At E_w , the foreign firm would sell its product at its marginal production cost cq^* and its mark-up $v^* = \beta^*$ would be zero. At this equilibrium, the national (or domestic) firm would not produce since its marginal cost would be greater than the foreign firm's cost.

In the trade dumping equilibrium, the foreign firm enters into the domestic market and produce three types of effects: The first effect (called the demand or competitive effect) is caused by an upward shift of the 'market marginal revenue' (MMR) derived from adding equation (1) and (3) and dividing by two (or taking a simple average of the firms equilibrium equations in the market of the dumped country). Thus MMR is defined by:

$$MMR = p(1 + z_p)^{-1} = c_p'; \text{ where } c_p' =$$

$$(8) \quad \frac{(c' + cq^*)}{2}; z_p = \alpha z + (1 - \alpha)z^*;$$

$$\alpha = c'(c' + cq^*)^{-1}; \text{ and } z \leq z_p \leq z^*$$

MMR is represented by $p_d(1 + z_p)^{-1}$ in Figure 1. This market marginal revenue tend to the market demand (i.e., $p_d = p(Q)$): a) as the number of established firms (national and foreign) increases; b) when the elasticity of the firms conjectural variation tends to zero, and c) when the behavior of the firms is perfectly competitive. As the MMR shifts up, the national firm marginal revenue shifts down due to reduction of the market price. This downward shift is represented by the change of the marginal revenue from $p(1 + z_o)^{-1}$ to $p(1 + z)^{-1}$. The demand effect in is the change from the autarky equilibrium E_m to E_c (Q_c, P_c). In this effect, it is assumed that all firms in the market have the same marginal cost and equal to the high cost firm (which is the domestic firm). As a consequence of the demand effect, the domestic firm decreases its output from Q_m to Q_c and the market price decreases from P_m to P_c . It should be clear, however, from equation (1) and (3) *that this first effect only exists if the market structure before the entry of the foreign firm is one of imperfect competition*. If the domestic market structure is perfect competition then this first effect is zero since both firms will face the same market price ($p = c'$) and the equilibrium would be at E_o (Q_o, c'). The second effect (called the *comparative advantage or cost effect*) comes from the fact that the average marginal cost of the market is reduced from c' to c_p' since the foreign firm has a lower marginal cost. This

effect is represented by the change of the equilibrium from allocation E_c (due to the demand effect) to the Dumping equilibrium $E_d (Q_d, P_d)$. At this equilibrium the market marginal revenue is equal to the simple average marginal cost c_p . Total consumption or domestic demanded quantity is Q_d , qd is supplied by the domestic firm and $q^* = Qd$ which is supplied or imported by the foreign firm.

Prices are also reduced from P_c (due to the first effect) to P_d due to this second cost effect. At the Dumping equilibrium, the domestic firm reduces its output, market share and profits despite of the increase of the quantity demanded and the lower price. *This second effect* does exist regardless of the autarky domestic market structure in the Dumping recipient country and *is caused by the cost comparative advantage of the foreign firm*. The *third effect* (called *welfare effect*) is on the social welfare of the domestic country. This effect is a result of the two previous effects. The welfare change in the dumped country is defined by:

$$(9) \quad dW = dS_0 - dS$$

Where dS_0 is the change of the deadweight loss due to the domestic monopoly and dS is the change of the deadweight loss due to the trade-dumping (or duopoly) equilibrium. At the autarky equilibrium the total social welfare is given by:

$$(7)' \quad W_A = W_{\max} + dW = W_0; \quad dW = -S; \quad dS = 0 \text{ and } dS_0 = -S$$

At this equilibrium there is not deadweight loss due to the Dumping ($dS=0$). Rather there is a deadweight loss due to the domestic monopoly, i.e., $dS_0 = -S$. Note that $W_A < W_{\max}$. That is, the domestic country is not maximizing its welfare. This result comes from the fact that: a) there is no trade; b) there is a domestic distortion due to the monopoly power of the national firm, and c) there is no competition or antitrust policy in both the domestic and foreign countries. At the Dumping equilibrium the effect on the social welfare of the domestic country is given by:

$$(7)'' \quad W_T = W_{\max} + dW = W_0 + S - dS \geq W_0 = W_A; \quad 0 \leq dS \leq S; \quad dS_0 = 0; \\ \text{and } dW = -dS;$$

What is striking and counterintuitive of equation (7)'' is that Dumping may produce an increase of the social welfare in the Dumped country. This is explained by two facts. The first one is that the monopoly power

in the domestic market is replaced by another distortion (i.e., a duopoly market) which has a positive effect on welfare. The second one is due to the opening up of the economy and increased competition in the domestic market. However, the increase of the domestic social welfare may not exist if the foreign firms behave as a perfect price discriminator (Varian, 1989). That is, if these firms charge to each (domestic) consumer the price that this is willingly to pay. In this case, the foreign firm receives all the gains from trade as measured by S .¹⁸ Except for this case, the Dumping distortion yields a social welfare improvement in the dumped country. This improvement comes from cheaper imports, more competition and the increase of the quantity consumed of the good.

A second striking and counterintuitive effect of the Dumping is that an instrument of commercial policy such as an antidumping tariff may also increase the social welfare of the dumped country. This increase comes from the fact that a tariff may transfer profits from foreign to domestic firms and Government through the import revenues (this is the rent shifting effect from Krugman-Brander, 1983). Thus, despite of the fact that free trade is welfare improving, the introduction of a distortion such as a tariff may also increase welfare. This result confirms the usual distinction between free trade and fair trade or the distinction between the gains from trade from efficiency grounds and the distribution of these gains between countries. For the dumped country, S or the area shaded $E_m F' E_w$ is the maximum gains from trade. In autarky these gains are not realized. When trade and the dumping of the foreign firms take place, part or the total gains from trade are realized. However, foreign firms through its profits also receive part of these gains. From the efficiency point of view, the dumping and free trade situation is more efficient than the autarky monopoly situation and the dumped country welfare may improve. An antidumping tariff although inefficient with respect to the dumping situation may improve domestic country's welfare since it avoids that part of gains from trade go to the foreign firm. Trade with a tariff for the dumped country is fairer than free trade with dumping. Next section formalizes these two counterintuitive results. So far, the main findings drawn from the model are:

Proposition 1. *Dumping based upon comparative advantage occurs in a market (developing country) when foreign firms (with market power in the foreign market) enter to compete into that market selling a product (pro-*

18. In this case $dS = S$ and $W_r = W_o$.

duced also by firms from the dumped country) to a lower price than in the foreign market.

Proposition 2. *As a consequence of the cost comparative advantage of foreign firms: a) the output of domestic firms, their profits, their market shares, and their selling market prices decreases, and b) imports increase.*

Proposition 3. *This dumping under free trade and a range of market structures in the dumped country does improve the social welfare of this country. However, this improvement is obtained by losing part of the maximum gains from trade that the dumped country would obtain if the firms (national and foreigners) have had a perfectly competitive behavior. These losses are transferred as profits to the foreign firms.*

■ Commercial policy under dumping based upon comparative advantage

This section formalizes the welfare results that intuitively were obtained in the former section. The social welfare of the dumped country is defined as:

$$(10) \quad W = \int p dQ - pQ + \pi - Su(q, s) + T(q^*, t) = \\ \int p dQ - pQ + (pq - C(q)) - Su(q, s) + T(q^*, t)$$

Wherein $\int p dQ - pQ$ is the consumer surplus,¹⁹ π is the profit function of the domestic firm; s is the production subsidy rate applied to the domestic firm; t is the antidumping tariff rate; $C(q)$ is the total cost of the domestic firm; Su and T are the Government expenditure in subsidies and the tariff revenues respectively. Taking differentials to [10]²⁰ and rearranging, we have:

19. Alternatively, it can be assumed a utility function $U(Q) + m$, where m is the monetary expenditure in other goods or a utility index of the rest of the goods. Assuming the marginal utility of money is one then $p = U'(Q)$. This specification and the one used in the model are equivalent (Brander-Spencer, 1984).

20. Equation (10)' is similar to equation (8) from Dixit (1988). That is, the welfare effect of an small shift of the dumping equilibrium situation can be decomposed in three effects: the home market distortion effect, $(p - c')(dq/dt + dq/ds)$; the terms of trade effect, $(-q^*p')(dQ/dt + dQ/ds) + dT/dt$; and the volume of trade effect, $(dT/dq^*)dq^*/dt$.

$$(10) \quad \dot{dW} = \left[(-q^* p') \left(\frac{dQ}{dt} \right) + \left(\frac{dT}{dq^*} \right) \left(\frac{dq^*}{dt} \right) + (p - c') \left(\frac{dq}{dt} \right) + dT / dt \left(\frac{dT}{dt} \right) \right] dt \\ + \left[-q^* p' \left(\frac{dQ}{ds} \right) + (p - c') \frac{dq}{ds} \right] ds$$

Taking differentials to equations from (1) to (3) we have:

$$(11) \quad A(dq \quad dQ^* \quad dq^*)' = (c^*{}' t dt \quad 0 \quad c's ds)' ;$$

where

$$(12) \quad A = \begin{pmatrix} p'(\beta^*/w^*)\theta^* + \delta^* & -cq^{*''} & p'[(\beta^*/w^*)(\theta^* - 1) + 1] \\ -cQ^{*''} & R^{**} & 0 \\ p'[(\beta/w)(\theta - 1) + 1] & 0 & p'(\beta/w)\theta + \delta \end{pmatrix}$$

and:

$$(13) \quad A(dq, dQ^*, dq^*)'$$

$$0 \leq \theta = (1 + \eta p^{-1} w) \leq 1; \quad 0 \leq \theta^* = (1 + \eta p^{-1} w^*) \leq 1; \quad \delta = (p' - c') < 0;$$

$$\delta^* = (p' - c^{*''}) < 0; \quad \eta p^{-1} = \frac{p'Q}{p'}; \quad w = \frac{q}{Q}; \quad w^* = \frac{q^*}{Q};$$

$$0 \leq \left[\left(\frac{\beta^*}{w^*} \right) (\theta^* - 1) + 1 \right] \leq 1; \quad 0 \leq \left[\left(\frac{\beta}{w} \right) (\theta - 1) + 1 \right] \leq 1;$$

$$c^*{}' t = \frac{dcq^{*'}}{dt} \geq 0; \quad c's = \frac{dc'}{ds} \leq 0; \quad -1 \leq \eta p^{-1} = \left(\frac{p'Q}{p'} \right)^{-1} \leq 0;$$

$$R^{**} = p^{*'}(1 + \eta p^{*-1}) + (p^{*'} - cQ^{*''}) < 0;$$

$$\frac{d^2 C^*}{dq^{*2}} = cq^{*''} = \frac{d^2 C^*}{dQ^{*2}} = cQ^{*''} \geq 0; \quad \eta p^{*-1} = \frac{p^{*''}Q}{p^{*'}};$$

$$|A| = R^{**} \left[-p'^2 (1 - \beta \beta^* (w w^*)^{-1} (1 + \left(\frac{\beta^*}{w^*} \right) (\theta^* - 1) + \left(\frac{\beta}{w} \right) (\theta - 1)) + \left(\frac{\beta^*}{w^*} \right) p' \theta^* \right. \\ \left. \left[\left(\frac{\beta}{w} \right) p' \theta + \delta \right] [R^{**} \delta^* - (c Q^{*'}) (c q^{*'})] \right] < 0$$

Solving (11) then:

$$(11)' \quad (dq \quad dQ^* \quad dq^*)' = A^{-1} (c^* t dt \quad 0 \quad c' s ds)';$$

The social welfare of the dumped country depends on: a) the domestic industry configuration and the behavior of both domestic and foreign firms, and b) the commercial policy instruments chosen by the Government of the dumped country. This section analyzes three types of market structure.

Dumping and commercial policy in perfectly competitive markets

In this case, both firms are price takers, then $\beta = \beta^* = c q^{*'} = \eta p^{-1} = 0$. Replacing these values on the matrix A, this is transformed to:

$$(12)' \quad A = \begin{pmatrix} p' & 0 & p' \\ -c Q^{*'} & R^{**} & 0 \\ p' & 0 & p' - c' \end{pmatrix}$$

and $|A| = -R^{**} p' c' < 0$

The effects of the commercial policy instruments on the firms' output and the market price of the domestic developing country are:

$$(14) \quad dq^* = (p' c')^{-1} [-(p' - c') c' t dt + p' c' s ds], \text{ for } dt > 0 \text{ and } ds > 0; \quad dq^* < 0$$

$$dt = (c')^{-1} [c' t dt - c' s ds]; \text{ if } dt > 0 \text{ or } ds > 0 \text{ then } dq \geq 0$$

$$dQ = dq + dq^* = p'^{-1} c' t dt < 0$$

$$dq = c' t dt > 0; \quad dp = 0, \text{ for } ds > 0;$$

For the welfare effects of the commercial policy instruments it is assumed that both the antidumping tariff and the production subsidy is specific to the level of imported quantity and output from the foreign and domestic firms respectively. Thus:

$$(15) \quad c'^*t = 1; \quad c's = -1; \quad \frac{dT}{dq^*} = t; \quad \frac{dSu}{dq^*} = s; \quad \frac{dT}{dt} = q^*; \quad \frac{dSu}{ds} = q;$$

Using (10)' and (15) the social welfare effect on the dumped country is:

$$(16) \quad dW = \left[(-q^*p') \left(\frac{dQ}{dt} \right) + t \left(\frac{dq^*}{dt} \right) + (p - c') \left(\frac{dq}{dt} \right) + q^* \right] dt + \left[-q^*p' \left(\frac{dQ}{ds} \right) + (p - c') \left(\frac{dq}{ds} \right) \right] ds$$

Replacing (14) into (16):

$$(16)' \quad dW = \left[(-q^*p') \left(\frac{1}{p'} \right) - t(p'c'')(p'c'')^{-1} + (p - c')(c'')^{-1} + q^* \right] dt \\ + \left[(-q^*p')(0) + (p - c')(c'')^{-1} \right] ds \\ dW = -(p' - c'')(p'c'')^{-1} \left[\frac{p's}{p' - c''} + t \right] dt - (c'')^{-1} s ds^{21}$$

Equation (16)' indicates that for a nonzero t and s rates, the welfare effect is negative, $dW < 0$. Thus, free trade is the optimal commercial policy for the dumped country when one or more of the following conditions hold: a) firms (national and foreigners) have a price taker behavior; b) the domestic market works as in perfectly competitive markets, c) there exists a coordinated competition policy²² among countries that participate in trade that make firms behaves as price takers. Under anyone of these conditions free trade is also a fair trade. In terms of the

21. Under perfect competition with a specific production subsidy $(p - c') = -s$.

22. The definition and the issues that involve a coordinated competition policy have been recently discussed by Martin (1999) and Greenaway and Walley (1998) in a special issue of the World Economy (in particular the works by Lloyd and that of Jacquemin-Lloyd-Tarakan-Waelbroeck); and Hoekman-Holmes (1999).

Figure No. 1, the dumping allocation is at point Ew (Qw, pw), and all the shaded area $EmF'Ew$ (i.e., the gains from trade) is received by the dumped country. Thus, dumping of the foreign firm eliminates all the domestic market distortions in the economy and the welfare received is the maximum possible W_{max} ($= W_0 + S$). The dumping distortion under these conditions is not because of the lower price of the domestic market but because of the higher price in the foreign market caused by monopolist power of this firm in that market.

A natural implication from this result is that developed countries under the GATT regulation on Dumping should not impose antidumping tariffs to the exports from developing countries when markets are working well, i.e., when (domestic) markets are highly competitive. This result confirms the theses of many authors (such as Finger, 1992), who argue that antidumping tariffs against exports from developing countries are in essence protectionist policies, i.e., the use of the Government to favor national firms against consumers and the social welfare of the developed country. It also hurts exports from developing countries since does not exploit their comparative advantage.

Dumping and commercial policies when foreign firm behaves as price taker in the dumped country

The welfare results analyzed in this section are similar to the former case, since the price taker behavior of the foreign firm regardless the behavior of the domestic firm, eliminates the domestic market power distortion generated by the national firm. In this case, $\beta^* = cq^{**'} = 0$ and $\beta/w = 1$. With these values, A is transformed to:

$$(12)'' \quad A = \begin{pmatrix} \delta^* & 0 & p' \\ -cQ^{**'} & R^{**} & 0 \\ p'\theta & 0 & p'\theta + \delta \end{pmatrix}$$

$$|A| = R^{**}p'(p' - c') < 0$$

The effects on the firms' output and the domestic market price are:

$$(14)' \quad dq^* = [p'(p'-c')^{-1}] \{ (p'\theta + \delta) c'^* dt - p' c' s ds \} < 0 \text{ for } dt \text{ or } ds > 0;$$

$$dq = -[(p'-c')^{-1}] \{ \theta c'^* dt - c' s ds \} > 0 \text{ for } dt \text{ or } ds > 0;$$

$$dQ = [p' \cdot (p'-c')^{-1}] (p'-c') c'^* t \cdot dt < 0 \text{ for } dt \text{ or } ds > 0;$$

$$dp = c'^* dt > 0 \text{ for } dt; \quad dp = 0 \text{ for } ds > 0$$

The respective effect on the dumped country social welfare is given by:

$$(17) \quad dW = \left[(-q^* p') \left(\frac{dQ}{dt} \right) + t \left(\frac{dq^*}{dt} \right) + (p - c') \left(\frac{dq}{dt} \right) + q^* \right] dt \\ + \left[-q^* p' \left(\frac{dQ}{ds} \right) + (p - c') \left(\frac{dq}{ds} \right) \right] ds$$

$$(17)' \quad dW = (p'-c')^{-1} \{ [t(\theta + \delta p'^{-1}) + s\theta] dt + s ds \} < 0 \text{ for } dt \text{ or } ds > 0$$

Once again, under a positive antidumping duty or production subsidy rate, the social welfare effect for the dumped country is negative. Thus, under a perfectly competitive behavior from foreign firms a free trade policy is the optimum commercial policy for the dumped country. The behavior of the foreign firm eliminates all the distortions in the domestic country. The dumped country obtains the maximum social welfare $W_{max} (=W_0 + S)$, i.e., this country receives all the gains from trade.

A practical test to investigate whether a foreign firm is behaving as a perfectly competitive firm is by estimating its mark-up $\upsilon^* = (p - cq^*)/p = -\beta^*/\eta$ in the market of the dumped country. The market price and the marginal production cost of this firm are the only data that are needed to estimate υ^* . Thus, if υ^* is close to zero then that behavior is tested. Next section analyzes the commercial policy in the case when υ^* is positive.

Dumping and commercial policy under a quantity Cournot duopoly

The usual case of dumping in developing countries occurs when both foreign and national firms have market power on the developing country. This section analyzes the case when both firms behave as

quantity Cournot duopoly. The general case is left out for the Mathematical Appendix. The Cournot firms in the model are defined when $\beta/w = \beta^*/w^* = 1$. Matrix A with these values is transformed to:

$$(12)''' \quad A = \begin{pmatrix} p'\theta^* + \delta^* & -cq^{**'} & p'\theta^* \\ -cQ^{**'} & R^{**} & 0 \\ p'\theta & 0 & p'\theta + \delta \end{pmatrix}$$

$$|A| = R^{**}[p'\theta^* \delta] + [p'\theta + \delta][R^{**}\delta^* - (cQ^{**'})(cq^{***})] < 0$$

The firms' output changes and the change in the market price due to the changes of the instruments of commercial policy are given by:

$$(14)'''$$

$$dq^* = |A|^{-1} R^{**} \{c^* t (p'\theta + \delta) dt - c' s p' q^* ds\} < 0 \text{ for } dt > 0 \text{ or } ds > 0;$$

$$dq = -|A|^{-1} \{c^* t R^{**} p'\theta dt - c' s [R^{**}(p'\theta^* + \delta^*) - (cQ^{**'})(cq^{***})] ds\} > 0$$

for $dt > 0$ or $ds > 0$;

$$dQ = |A|^{-1} \{c^* t \delta R^{**} dt + c' s (R^{**}\delta^* - (cQ^{**'})(cq^{***}))\} ds; \quad dQ < 0 \text{ if } dt > 0;$$

$dQ > 0$ if $ds > 0$;

$$dp = p' |A|^{-1} \{c^* t \delta R^{**} dt + c' s (R^{**}\delta^* - (cQ^{**'})(cq^{***}))\} ds;$$

$dp > 0$ if $dt > 0$;

$dp < 0$ if $ds > 0$. Note that if $c^* t = -c' s$ and $dt = ds$ then:

$$dQ = |A|^{-1} \{R^{**}(\delta - \delta^*) + (cQ^{**'})\} ds; \text{ for } dt = ds > 0$$

The welfare effects on the dumped country from are:

$$(18) \quad dW = \left[(-q^* p') \left(\frac{dQ}{dt} \right) + \left(\frac{dT}{dq^*} \right) \left(\frac{dq^*}{dt} \right) + (p - c') \left(\frac{dq}{dt} \right) + \frac{dT}{dt} \right] dt + \left[-q^* p' \left(\frac{dQ}{ds} \right) + (p - c') \frac{dq}{ds} \right] ds$$

$$(18)' \quad dW = p'^{-1}(1 - \delta) \left[-(p - cq^*)(1 - \gamma)(1 - \delta)^{-1} + t + (p - c')\delta(1 - \delta)^{-1} \right] dt + \left[-q^* p' \left(\frac{dQ}{ds} \right) + (p - c') \frac{dq}{ds} \right] ds$$

Where:

$$(19) \quad \text{If } dt > 0 \text{ and } ds = 0 \text{ then; } 0 < p' \left(\frac{dq^*}{dt} \right) = |A|^{-1} p' R^{**} (p' \theta + \delta) = \tau \leq 1;$$

$$0 \leq p' \left(\frac{dQ}{dt} \right) = |A|^{-1} p' \delta R^{**} = \gamma \leq 1;$$

$$-1 < p' \left(\frac{dQ}{dt} \right) - p' \left(\frac{dq^*}{dt} \right) = \gamma - \tau = \lambda = p' \left(\frac{dq}{dt} \right) = -|A|^{-1} p' (R^{**} \cdot p \theta')$$

$$0 \leq \frac{dQ/ds}{dq/ds} = \frac{[(R^{**} \delta^* - (cQ^{*'}) (cq^{*'}))]}{[R^{**} (p' \theta^* + \delta^*) - (cQ^{*'}) (cq^{*'})]} = \phi \leq 1;$$

If $dt = 0$ and $ds > 0$ then

$$0 \leq \phi = \left(\frac{dQ/ds}{dq/ds} \right) = \frac{[R^{**} (p' - cq^{*'}) - (cQ^{*'}) (cq^{*'})]}{[R^{**} (p' \theta^* + \delta^*) - (cQ^{*'}) (cq^{*'})]} \leq 1 \text{ If } t = s \text{ a}$$

$$1 \leq p' \left(\frac{dq}{ds} \right) = p' \left(\frac{dq}{dt} \right)$$

$$\lambda = -|A|^{-1} p' \{ R^{**} p' \theta + [R^{**} (p' \theta^* + \delta^*) - cQ^{*'}] (cq^{*'}) \} \leq 0$$

$$-1 \leq \left(\frac{dQ/ds}{dq/ds} \right) = - \frac{[R^{**}(\delta - \delta^*) + (cQ^{**'}) (cq^{**'})]}{[R^{**}p'\theta^* + R^{**}(p'\theta^{**} + \delta^*)(cQ^{**'}) (cq^{**'})]} = \phi \leq 0$$

$$= \phi \leq 0; 1 \leq 1 - \lambda(2 + \phi) = \varphi \leq 3; 0 \leq p' \left(\frac{dQ}{dt} \right) = p' \left(\frac{dQ}{ds} \right) =$$

$$-p'|A|^{-1} \{-\delta R^{**} + (R^{**}\delta^* - (cQ^{**'}) (cq^{**'}))\} = \gamma \leq 1$$

$$|A| = p' \{ R^{**}\theta^* \delta + [\theta + \delta / p'^{-1}] [R^{**}\delta^* - (cQ^{**'}) (cq^{**'})] \} < 0$$

$$dW = p'^{-1}(1 - \lambda) \left[-(p - cq^{**})(1 - \gamma)(1 - \lambda)^{-1} + t + (p - c')\lambda(1 - \lambda)^{-1} \right] dt + \left(-\frac{dq}{ds} \right) \left[-(p - cq^{**})\phi + t\phi + (p\eta^{-1}\beta + s) \right] ds$$

$$(20) \quad dW = p'^{-1}(1 - \lambda) \left[-(p - cq^{**})(1 - \gamma)(1 - \lambda)^{-1} + t + (p - c')\lambda(1 - \lambda)^{-1} \right] dt + \left(-\frac{dq}{ds} \right) \left[-(p - cq^{**})\phi + t\phi + (p\eta^{-1}\beta + s) \right] ds$$

Under the absence of a coordinated competition policy among trading countries and other instruments of trade policy, equations (18) and (19) imply that the optimum antidumping tariff for the dumped country is:

$$(21) \quad top = (p - cq^{**})(1 - \gamma)(1 - \lambda)^{-1} - (p - c')\lambda(1 - \lambda)^{-1} \geq 0;$$

If $t < top$ then $dW/dt > 0$; if $t > top$, $dW/dt < 0$.

and $(p - c') \geq 0$ for all $t > 0$

Equation (21) suggests that the optimum antidumping tariff (top) is a kind of weighted average of the two distortions in the market of the dumped country. The domestic distortions ($p - c'$) and the dumping-trade distortion ($p - cq^{**}$). Under free trade and perfectly competitive behavior of the firms both distortions are eliminated and the optimum

tariff is zero. According to GATT rules (WTO, 1999), *'the Anti-Dumping duty should not exceed the Dumping margin (DM) defined as the difference between the consumer price of the foreign firm relevant market (p^*) and its export price into the domestic market ($px^*=cq^*$)'*. In terms of the notation of the model developed, $DM = p^* - cq^*$. But:

$$(22) \quad DM_n = p - c \leq top \leq Dmf = p - cq^* \leq p^* - cq^* = DM$$

The inequalities indicated by (22) suggest that the magnitude of the antidumping duty allowed by the GATT in most of the cases seems to be greater than the optimal duty. That is, there is danger that this duty decreases the social welfare of the dumped country. This is more likely to occur the more competitive is the domestic market. In such cases, the antidumping duty has the same effects as an import duty: on the one hand, it will become an instrument of protection and on the other hand, it will provide the wrong market signals (i.e., similar to one existent in the Import Substitution Industrialization development strategy²³) for the national producers that lobby their Governments to protect them against foreign competition.

The optimum production subsidy rate for the domestic firm (under the absence of a coordinated competition policy and any other trade policy instrument) is:

$$(23) \quad sop = (p - cq^*)\phi - p\eta^{-1}w \geq 0 \text{ if } s < sop, \quad dW/ds > 0 \\ \text{if } s > sop; \quad dW/ds < 0 \text{ and } (p - c') \leq -(p - cq^*)\phi \leq 0; \text{ for } s \geq sop;$$

A third trade policy can be obtained when the domestic country Government impose simultaneously an anti-dumping tariff and output subsidy of the same rate. That is, for $t=s$; and $dt=ds$ the optimum rate in the absence of a coordinated competition policy is²⁴:

23. Little-Scitosvsky-Scott, 1970; Krueger, 1978.

24. In practice, to estimate the optimum policy instruments, it can be used the initial values of market variables at the Dumping equilibrium. In general, these estimates will underestimate the optimum values for the case of the antidumping tariff and the common subsidy and tariff rate, and overestimate the optimum subsidy rate. Using these values an iterative process or a two step procedure can be applied. Details of this process are found in the Mathematical Appendix.

$$(24) \quad dW = (p^{-1})\phi[-(p - cq^*)((1 - \gamma) - \lambda\phi)\phi^{-1} + t - 2(p\eta^{-1}w)\lambda\phi^{-1}]dt$$

$$(25) \quad top = sop = (p - cq^*)[(1 - \gamma) - \lambda\phi]\phi^{-1} + 2(p\eta^{-1}w)\lambda\phi^{-1} \geq 0;$$

$$\text{if } t < top; \frac{dW}{dt} > 0; \quad \text{if } t > top; \frac{dW}{dt} < 0;$$

$$(p - c') \leq -[(p - cq^*)[(1 - \gamma) - \lambda\phi]\phi^{-1} + (p\eta^{-1}w)(1 + 2\lambda\phi^{-1})] \leq 0;$$

$$\text{for } s > sop$$

The ranking of the trade policies considered here are listed in Table 2. This ranking was obtained from the trade instruments effects on welfare. The benchmark in the table is the Trade-Dumping equilibrium. It should be clear that if there is a coordinated competition policy among partner countries then free trade is always the optimal trade policy for the dumped country. The main results of this section can be summarized in the following propositions.

TABLE 2
Social Welfare Rank Relative to the Trade-Dumping Equilibrium

No. rank	Economic policy/market situation	Changes of	
		Quantity	Prices
1	Free trade if the mark up of the foreign firm is close to zero.	+	-
1	Free trade in the domestic country and coordinated competition policy in both domestic and foreign countries.	+	-
2	Production subsidy to national firm.	+	-
3	Production subsidy to nationals and import tariffs to foreign firms.	-	+
4	Anti-dumping tariffs.	-	+
5	Dumping of the foreign firm in the market.	0	0
6	National firm monopoly without imports.	-	+

Source: Mathematical Appendix. The changes of prices and quantities is with respect to the dumping equilibrium of foreign firms.

Proposition 4. *When foreign firms behave a price taker in the market of the dumped country, then free trade is the optimal trade policy for that country. Alternatively, when the market mark-up (relative to the market price) of the foreign firms in the dumped country is close to zero the price*

taker behavior of these firms can be accepted and no antidumping measure is needed.

Proposition 5. *When trade is based upon comparative advantage between countries and foreign firms exploit this advantage and their market power in a market of the dumped country then free trade together with a coordinated competition policy among trading countries are the optimal (and first best) policies.*

Proposition 6. *In the absence of a coordinated competition policy, the second best optimal trade policy that the Government of the dumped country could impose is a specific production subsidy to the national firms that compete with the import products from foreign firms. This subsidy yields: a lower market price; an increase in the output and domestic market share of the national firms and an increase in the social welfare of the Dumping recipient country. This second best policy will be more effective if the subsidy: a) it is temporal (say at most five years; b) it is addressed to increases the total factor productivity of the national.*

■ Conclusions

Antidumping measures have been rising since beginning of 1980s. Moreover, a new and latest evidence from late 1990s until 2004 shows that this increase (besides the traditional developed countries users such as United States, Canada, Europe and Australia) comes from new users countries from the third world (such as Brazil, China, and Mexico).²⁵ Using a dumping model under imperfect competitive international market structures, this paper has shown these *antidumping measures allowed by the GATT not necessarily are welfare improving for the dumped (developing) country*. Antidumping duties produce a trade-off between the trade gains accrued to domestic firms (which compete with foreign imports) and the government (through tariff revenues) and the reduction of the consumers' welfare gains whose pay a higher import prices. When the antidumping duty is higher than the optimal tariff then welfare would decrease in the dumped country. *The analysis of the optimal trade policy under this model suggests that the developing country has several welfare improving alternatives to the antidumping duties.* These are:

25. Prusa, 2005.

1. In absence of a coordinated competition policy between the trading countries, the free trade-dumping equilibrium for the dumped country is the first best policy as long as the industrial configuration under dumping is one wherein the domestic price reflects the real international competitive (marginal) costs of the firms. Thus, the gains from trade are maximized for the dumped country whenever the industrial configuration under dumping behaves as a perfectly competitive market. The gains from trade are also maximized for the dumped country when there is free trade and a coordinated competition policy between trading countries. These policies will produce a free and fairer trade for those countries. *This result suggests the importance of international competition policies for the GATT rules and for the rounds of negotiations at the WTO.*
2. Under the absence of a coordinated competition policy and when the domestic market of the dumped product is not working as a perfectly competitive market, then free trade is not longer the optimal policy. Second best trade policies may be on the one hand, a production subsidy to national firms and on the other hand, an antidumping duty to imports together with a production subsidy to national firms. Both trade instruments at the same rate. These trade instruments increase the social welfare of the dumped country through the transference of foreign firms' profits to national firms' and to Government revenues. The production subsidy to national firms is recommended when (developing) countries do not have fiscal budget problems. The antidumping duty together with the production subsidy is recommended to countries with fiscal budget constraints and/or when imports dominate the market of the dumped product. These second best policies should be temporal and be granted to national firms as long as the subsidy resources are addressed to improve the total factor productivity of the firms in order to gain comparative and competitive advantages over foreign firms.

The antidumping duty allowed by the GATT and the WTO is the least recommendable trade policy from the welfare point of view of the dumped country. Its level and permanency as allowed by the GATT and the WTO could produce the wrong market signals to national firms from the dumped (developing) country. Furthermore, the social welfare of the dumped country may be reduced. These results claim for revisions of the GATT rules on the dumping analyzed here. Otherwise and on the one hand, developed countries may continue and unnecessarily restrict-

ing exports from developing countries even in products traded in highly competitive markets. On the other hand, developing countries should be aware on these considerations on their trade negotiations and to re-think whether or not to continue to implement the GATT antidumping rules. In any case, the model of the dumping based upon the comparative advantage shows the importance of *a coordinated competition policies between trading countries*. International competition policies can be thought as another set of trade policies instruments that countries may use in order to obtain a fairer and freer trade.

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