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MONOPOLY AND TRADE POLICY

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ABSTRACT

This paper presents a general equilibrium technique for the problem of ranking policies of a nation that trades with a foreign monopoly firm by presenting a generalization of the offer curve. The paper demonstrates the existence of a partial welfare ranking between ad valorem rates and specific rates, and it shows that a minimum import requirement welfare dominates other quantitative policies. The paper proves that a recent policy, the voluntary import expansion, has strongly adverse consequences: when trading with a foreign monopoly firm a nation implementing such a policy will achieve only its autarky level of welfare.

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1. Introduction[1]

The theory of commercial policy is currently undergoing substantial changes as the policy properties of trade models of imperfect competition are being investigated. Motivated in part by a political concern for industry structure, as exemplified by the debates surrounding the aircraft and computer industries, the emphasis has been on trade models in which governments set policies to support domestic firms with market power either in domestic or in foreign markets. This paper investigates, instead, the trade policy problem facing a nation which conducts its international trade with a foreign-owned monopoly firm. European nations would frequently grant to a domestic trading house exclusive rights to conduct trade with some foreign nation, and it has been proposed, more recently, that OPEC acts as a rent-maximizing cartel.

A first analysis was offered by Katrak (1977) and Svedberg (1979), who showed that a positive import tax is the optimal tariff policy in a partial equilibrium model with linear demand for the import good and constant marginal cost for the monopolist. Katrak found, in addition, that a tax on consumption of imports welfare-dominates the optimum tariff, while De Meza (1979) argued that a price ceiling equal to the monopolist's marginal cost is yet better. More recently Brander and Spencer (1984) relaxed the assumption of linear demand, and showed that not only does the order of magnitude of the optimal tariff depend upon parameter values of the model, but so does the sign of the optimal intervention. If the elasticity of import demand increases in consumption, the optimal *ad valorem* policy is a subsidy, while the optimal specific policy is a subsidy if import demand is "very convex." Indeed there are demand functions with the property that if a rate is *ad valorem* the optimal policy is a tariff, while if the policy is *specific* a subsidy is called for. Jones (1987) demonstrated that this ambiguity holds in general equilibrium as well, and Helpman and Krugman (1989) have most recently surveyed these results.

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This paper generalizes the earlier work by presenting a new technique and applying it to derive rankings, in general equilibrium and for general demand and cost structures, of tariffs, subsidies, and various quantitative and pricing restrictions. It is shown that the standard assumption in the literature, that monopoly cost is a function solely of the amount of goods shipped to the importing country, implies that monopoly iso-profit curves can be drawn in the space of net trades. These curves play a role analogous to that of trade indifference curves in the case of foreign price-taking agents and, in particular, allow for the derivation of a locus describing the monopoly firm's preferred trade as a given type of home trade policy instrument takes different values. Such a locus, which will be called a *Stackelberg locus*, plays an analogous role in the home government's policy problem as would a foreign offer curve. The present paper thus weds the hitherto partial equilibrium literature on trade policy against a foreign monopoly firm to the earlier general equilibrium literature on the optimal tariff and its extensions to retaliation and quantitative restrictions by Graaf (1949), Scitovsky (1942), Johnson (1954), Rodriguez (1974), and Tower (1975).

It is demonstrated that a voluntary import expansion by a monopoly firm has a positive effect on the welfare of the trading partner if the partner maintains free trade. If, however, the expansion is so large as to require that the partner subsidizes trade, welfare might fall below the free trade level and it could reach the autarky level. Any ambiguity disappears if a voluntary expansion of imports is implemented by a nation consisting of price-taking consumers and producers rather than by the foreign monopoly firm: Welfare must fall to its autarky level. The paper establishes also that a minimum import requirement dominates other quantity-setting policies but that it might be inferior to a price ceiling, or even to a tariff, when monopoly cost is increasing. Finally, it is shown that while a price ceiling dominates a tariff, a ranking between a price ceiling and an entry fee depends upon monopoly cost.

In an analysis of non-tariff barriers to trade, section 2 introduces the concepts of an iso-profit curve and a *Stackelberg locus* . Section 3 extends the analysis to tariffs and subsidies, and section 4 presents concluding remarks.

2. The Iso-Profit Curve and the Stackelberg Locus

Let there be two goods, 1 and 2, demanded by price taking consumers in a country denoted as home, which is the location also of price taking firms that produce both goods under constant returns to scale technologies.[2] International trade takes place with a foreign-owned monopoly firm whose cost is assumed to be a function of the volume of goods it brings to the home country only.[3] If m is the home country's import of good 2, and $c(m)$ is the total cost function of the monopoly firm, then the monopoly's objective is to set p^e, which denotes the tariff-exclusive price of good 2 in terms of good 1, such as to maximize its profits,

(1) $\pi = p^e m - c(m)$.

The volume of exports of the home country is denoted by x, and the condition of balanced trade is,

(2) $p^e m = x$.

Substituting this into (1) for the value of imports, differentiating with respect to m and x, and setting the resulting expression equal to zero, shows that the slope of an arbitrary iso-profit curve in the space of net trades can be written as the inverse of the monopoly's marginal cost,

(3) $(dm/dx)_\pi = 1/c'(m)$.

Figure 1 presents diagrams of iso-profit curves under various assumptions about the cost function. Constant marginal cost implies that iso-profit curves are lines as presented in panel (a), while panels (b) and (c) present curves for increasing and decreasing marginal cost, respectively. When measured in units of the numeraire good 1, the profits implied by an arbitrary curve are given by the distance between its intercept with the horizontal axis and the origin.

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[2] The common assumption in the literature has been that the home country is specialized in the production of good 1.

[3] This assumption, which is standard in the literature on trade with a foreign monopoly, is essential for the following analysis since it permits a representation of the firm's profits in the space of net trades. Monopoly cost could be interpreted, for example, as cost of transportation.

The monopoly firm's objective amounts to striving for the highest-valued, feasible, iso-profit curve, where feasibility is defined as the set of net trades offered by the home country. The home country's objective, on the other hand, is to maximize its real income or, as expressed in terms of figure 1, to reach its highest-valued, feasible, trade indifference curve (not drawn). Assuming that the monopoly firm willingly trades as long as it does not incur any losses, the home country's feasible set consists of all the points on or to the right of a zero-profit curve, π_0. The first-best trade policy is that which implements the point of tangency between π_0 and a trade indifference curve. Under constant marginal cost, this is a price ceiling,[4] while increasing marginal cost calls for an entry fee, T_0, in addition to a price ceiling. When marginal cost is decreasing, the government should announce a non-linear price schedule that lies strictly between π_0 and the indifference curve tangent to π_0 everywhere except at the point of optimum.

Sophisticated non-linear price schedules are, of course, rarely applied and, indeed, recent years have seen a proliferation of non-tariff barriers. If O_{FT} in figure 2 denotes the home country's free trade offer curve and point A is the free trade equilibrium, which is given as a point of tangency between the offer curve and an iso-profit curve, an *import quota*, $\overline{m}$, implies that the government presents to the monopoly firm the offer curve OB$\overline{m}$.[5] Assuming that point B implies non-negative profits, the monopoly firm chooses this point as its preferred trade thereby capturing all the quota revenue in the form of a higher price.[6] A *voluntary export restraint* (VER) by the monopoly firm, on the other hand, implies that it chooses a point on the home country's offer curve below the point of free trade, A, in figure 2. If, in particular, the firm chooses to restrain exports to the level $\overline{m}$, then point B is the equilibrium, and the import quota and the VER emerge as equivalent policies.[7] Of course, neither policy should ever be observed since they make both parties worse off.

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[4] This was De Meza's (op. cit.) result.

[5] The offer curve analysis of quotas originates with Rodriguez' (op. cit.) demonstration that autarky will be approached in a two-country non-cooperative quota game. Although the zero-profit locus in figure 2 is drawn to reflect increasing cost, the discussion holds for constant and decreasing cost as well.

[6] In her recent analysis of quota auctions, Krishna (1988) discusses how this translates into a zero price for a license to import. This result has an analogue in the tariff retaliation literature where Tower (op. cit.) demonstrated how a quota will never be preferred to free trade from the point of view of a Stackelberg leader in a two-country tariff game.

[7] Takacs (1978) stated this equivalence.

A *minimum import requirement*, which has recently been introduced by Helpman and Krugman (op. cit.),[8] has the home government present to the monopoly firm a minimum import level together with a willingness to pay for the critical volume. Stated in terms of figure 2 this policy implies that the home government presents an offer curve with a horizontal segment to the left of the free trade offer curve at the minimum required import level, $\underline{m}$, and a segment equal to the free trade offer curve for larger volumes of imports. The monopoly firm chooses as its preferred point of trade the kink on this offer curve. Thus the optimal minimum import requirement is the one that implements the point of intersection between the free trade offer curve and the zero-profit locus, i.e. point E in figure 2, and it welfare dominates the quota and the voluntary export restraint.[9]

Contrary to the motivation behind the minimum import requirement, trade expansion is rarely an attempt at securing improved terms of trade but is rather a response to a foreign request for increased access to domestic markets. Thus suppose that the monopoly firm implements a *voluntary import expansion*, that is, it agrees to buy at least some volume, $\underline{x}$.[10] If the home country could effect the value of $\underline{x}$ then, in order to maximize its welfare, it would want the monopoly firm to import the amount corresponding to the point where the home offer curve is vertical (point D in figure 2) and let the monopoly firm charge the corresponding price (OD). Home welfare would increase and monopoly profits fall.

A further expansion of the monopoly firm's imports would imply that the home country moves off its free trade offer curve requiring that the home government applies a trade subsidy. Thus if the monopoly firm, rather than the home government, were to determine the value of $\underline{x}$, and in addition were to set a uniform price, then it would choose the quantity and the price implied by a point of tangency between the home country's autarky trade indifference curve, u_{AU}, and an iso-profit curve. This point is given by E with the implication that the home country surrenders all its gains from trade while monopoly profits increase.

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[8] They confine their discussion to the case of constant marginal costs in which case this policy implements the first best trade from the point of view of the home country.

[9] It is only under constant monopoly cost that the minimum import requirement implements the first best. Neither under increasing cost (illustrated in figure 2) nor under decreasing cost is point C one of tangency between a home trade indifference curve and a zero profit curve.

[10] Bhagwati (1987), who suggested the name of this policy, discusses it in the context of trade relations between the United States and Japan. Dinopoulos and Kreinin (1990) present a careful analysis of it in a two-country model of price-taking producers and consumers.

Proposition 1. *Under free trade by the home country a voluntary import expansion by the monopoly firm raises welfare and lowers monopoly profits until the trade volume corresponds to that implied by unit elastic import demand. To further raise the monopoly firm's volume of imports the home country must subsidize trade. The monopoly firm's optimal voluntary import expansion is where an iso-profit curve is tangent to the home ocuntry's autarky trade indifference curve.*

Suppose instead that the pressure for expanded trade originates with the foreign firm asking the home country to raise its imports to some level, $\underline{m}$. The home country then presents an offer curve with a horizontal segment at $\underline{m}$ to the right of the free trade offer curve in addition to the part of the free trade offer curve above $\underline{m}$. The monopoly firm chooses point F. While, again, the home country surrenders all gains from trade, a comparison of points F and A reveals that the effect of the voluntary import expansion on monopoly profits is ambiguous; indeed, if monopoly cost increases sufficiently rapidly the voluntary import expansion could imply smaller profits than does free trade.

Proposition 2. *A voluntary import expansion by the home country reduces its welfare to the autarky level. The effect on monopoly profits is ambiguous and depends upon its cost function.*

With the exception of the case where the voluntary import expansion by the monopoly firm is met with a subsidy, a voluntary import expansion has quite strong adverse effects on the party implementing it, the reason being that the trading partner not only experiences a terms of trade improvement but also becomes the party determining the relative price. Thus when the monopoly firm sets a voluntary import expansion it also surrenders its pricing rule if the home country is succesful at insisting on its free trade position. Likewise, the home country by presenting to the monopoly firm a horizontal offer curve sacrifices any ability to affect its terms of trade. It might be argued that a nation that initially subscribes to free trade would be unlikely to implement a voluntary import expansion. However, the strongly adverse effect on welfare does not depend upon the nature of the initial equilibrium. Thus even if the home country were restricting trade at the outset, a voluntary import expansion would lead to autarky welfare unless it were combined with an announcement of an upper boundary on the willingness to export for any amount of imports. The free trade offer curve could constitute such a boundary.

A *price ceiling* not used in conjunction with a lump-sum fee presents to the monopoly firm a kinked offer curve consisting of a linear segment emanating from the origin with slope determined by the ceiling, as well as the part of O_{FT} that corresponds to import prices that are lower than the ceiling. As discussed above the price ceiling implements the first-best trade when marginal cost is constant. Panel (a) of figure 3 illustrates the price ceiling for the case of increasing cost. For price ceilings between those given by line segments OA and OG, the monopoly firm chooses the kink on the implied offer curve, while at point G there is tangency between a price line and an iso-profit locus. For all price ceilings lower than line segment OG, the monopoly firm's preferred points are given by points of tangency. Connecting all these points for all price ceilings yields a concave locus, *OG*, representing the monopoly firm's profit-maximizing net trades as function of the home country's willingness to trade. The locus shall be referred to as the monopoly firm's *price ceiling Stackelberg locus*.[11] The optimal price ceiling is implied by a point, H, where a trade indifference curve is tangential to *OG*. If monopoly cost is relatively low and increases slowly at low import levels, then the iso-profit loci are relatively steep for small import volumes. This implies, in turn, that *OG* is relatively steep for small import levels, and it is possible that the optimal price ceiling at G welfare dominates the optimal minimum import requirement at C. With a less concave *price ceiling Stackelberg locus* it is possible to establish the reverse ranking.[12]

Proposition 3. *When monopoly cost is constant or decreasing, the optimal price ceiling is equivalent to the optimal minimum import requirement. When monopoly cost is increasing the ranking between the two policies depends upon demand and cost conditions.*

Due to the fashion in which the minimum import requirement reshapes the home country's offer curve the implied equilibrium does not depend upon the curvature of the iso-profit curves in the sense that it will always be given by the point of intersection between the free trade offer curve and the zero-profit curve. When monopoly cost is increasing the price

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[11] For the two-country tariff game Johnson (op. cit.) derived, for each country, a locus of welfare-maximizing net trades for all positive tariffs of the trading partner, which he labelled a *welfare-reaction* curve. In recent years the concept of a reaction curve has come to mean a best-response locus in strategy space. For the present paper, this space would be defined by the home country's policy variable (for the discussion at hand, a price ceiling) and the terms of trade as set by the monopoly firm. I have refrained, accordingly, from referring to *OG*, or any of the loci derived for other policies later in the paper, as reaction curves but rather chosen the labeling *Stackelberg locus* to stress that these loci represent the monopoly firm's best response although not in strategy space.

[12] The case of decreasing cost is illustrated in panel (b), where, again, the optimal price ceiling implements the point of intersection between the free trade offer curve and the zero-profit locus, as given by point C, and thus is equivalent to the optimal minimum import requirement.

ceiling, on the other hand, cannot implement this point since at the price equal to marginal cost, the monopoly earns positive profits. A further lowering of the ceiling from point G implies improved terms of trade but a smaller volume of trade, which defines also the trade-off involved in the comparison with the minimum import requirement.

Consider finally an *entry fee*, T_0. If the fee is paid in units of the home country's imported good, the point from which the home country's offer curve originates is shifted up to point T_0 as indicated in panel (a) of figure 4. If, furthermore, T_0 represents the optimal entry fee, then the corresponding offer curve, O_{T_0}, is tangential to the monopoly firm's zero profit locus, π_0, at some point, I. At this point there is tangency between a trade indifference curve and a budget line emanating from T_0.[13] Since the intra-marginal distortion due to mark-up pricing remains, the first-best trade is not implemented. Under increasing marginal cost, which is considered in panel (b), the ranking between the entry fee, at point I, and the minimum import requirement (and the price ceiling) leading to point C becomes ambiguous as does the ranking between the optimal entry fee and the optimal price ceiling at point H. Under decreasing cost, which is illustrated in panel (c), the optimal minimum import requirement and the optimal price ceiling both lead to point C and both dominate the entry fee at I.

Proposition 4. *When monopoly cost is constant or decreasing, the optimal minimum import requirement welfare dominates the optimal entry fee. This ranking may be reversed when monopoly cost is increasing.*

The optimal entry fee consistently taxes away all monopoly profits but in a lump-sum fashion and, therefore, does not eliminate the distortion from the monopoly firm's mark-up pricing; the equilibrium remains one of tangency between an entry-fee-inclusive offer curve and an iso-profit curve.[14]

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[13] Assuming that home preferences are homothetic, point I lies on a ray from point Q through point A, where point Q corresponds to zero consumption of both goods in the home country.

[14] In terms of price-quantity diagrams the equilibrium remains where marginal revenue equals marginal cost. When compared to a minimum import requirement, which implements the point of intersection between an import demand curve and the monopoly firm's marginal cost curve, the entry fee implies a smaller volume of trade regardless of monopoly cost and a movement along the marginal cost curve until marginal cost equals marginal revenue, whose effect on the terms of trade depends solely upon the shape of the cost function.

3. Tariffs and Subsidies

Although the use of tariffs has greatly diminished in recent years, the analysis of the tariff remains important for the practitioner as there is mounting international pressure to have nations convert their non-tariff barriers into equivalent tariff rates. Suppose the home country quotes an *ad valorem* rate tariff, $\tau > 0$, or a subsidy, $\tau < 0$, such that the domestic relative price of the imported good in the home country is given by $p = (1+\tau)p^e$.

In classical tariff theory, the optimal tariff is implied by a point of tangency between a foreign offer curve and a home trade indifference curve. Although a foreign offer curve is not defined for the present problem, it is possible to apply the technique used in deriving the *price ceiling Stackelberg locus* in the previous section to derive a locus describing the monopoly firm's desired net trades as function of home tariffs and subsidies. In the determination of the optimal trade policy, this locus plays a role analogous to a foreign offer curve.

Thus consider figure 5, where O_{FT} is the home country's free trade offer curve. Locus AV is found by drawing all *ad valorem* tariff- and subsidy-distorted offer curves for the home country, on each of these curves finding the point of tangency with an iso-profit curve of the foreign monopoly, and finally connecting the points of tangency. The implied locus is referred to as the monopoly firm's *ad valorem Stackelberg locus*. In a neighborhood around free trade the locus thus tends to be relatively flat, or even negatively sloped, if the elasticity of import demand increases by much as import demand falls due to the substitution effect from the tariff, or if monopoly cost is rapidly increasing in the import volume.

The optimum *ad valorem* rate is found by searching for the point of tangency between AV and the highest-valued trade indifference curve. Let v be a measure of the extent to which trade is restricted or induced *at the initial free trade price*. A given value of v defines, then, an offer curve whose elasticity is denoted by the function $n\ (m;\ v)$. The monopoly firm chooses a price, p^e, such that,[15]

(4) $\qquad p^e = n\ (m;\ v)\ c'(m)$

[15] If e denotes the elasticity of import demand, then the monopolist's mark-up pricing rule is given by $p^e = [e/(e-1)]\ c'(m)$. The elasticity of the offer curve is defined as $n = (dm/m)/(dx/x)$. Since $e = -n/(1-n)$, equation (4) follows.

implying more favorable terms of trade, the more elastic is the offer curve (i.e. the smaller is n), and the lower is the monopoly firm's marginal cost. If $u\ (m,\ x)$ denotes the home country's *Meade* utility function as defined over trade volumes,[16] the government's problem can be written as,

(5) *Choose* τ *to maximize* $u(m, x)$ *subject to equations (2) and (4).*

which implies, in turn, that the optimal *ad valorem* tariff or subsidy is given by,

$$(6) \qquad \tau = \left(\frac{\partial n / n}{\partial m / m} + \frac{mc''}{c'} \right).$$

The optimal tariff is larger, the larger is the increase in offer curve elasticity as the volume of imports falls (i.e. the more n falls as m falls), and the faster marginal cost increases.

This analysis suggests a different interpretation of the optimal rate than that offered by Helpman and Krugman (op. cit.),who present the following expression for and discussion of the optimal (*specific*) rate:

> "[...] the optimal tax is implicitly defined by $t = m\ (t\ )\{p\ '[m\ (t\ )] - \frac{1}{m\ '(t\ )}\}$. This formula does not depend upon market structure in the foreign country; it applies to the case of a foreign monopolist as well as to other cases, such as foreign oligopoly. Foreign market structure affects the shape of m(t), thereby affecting the optimal tax *level* but not the tax *formula*." (p. 59; their emphasis.)

While it is correct that their formula does not depend upon market structure in the foreign country (it is derived from the home country's budget constraint), the remark that foreign market structure affects the shape of the home country's import demand curve cannot be supported even if the monopoly pricing rule were incorporated and an expression for the *specific* rate, similar to (6), was derived. The correct statement is that foreign market structure affects, or indeed determines, which *point* on the home import demand curve will be realised as equilibrium price and quantity, but it affects neither shape nor location of the import demand curve (or offer curve).

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[16] Dixit and Norman (1980) discuss its properties.

Should the home country quote a *specific* tariff, t > 0, or subsidy, t < 0, instead, the price equation becomes $p = p^e + t$. Define as τ_E the *ad valorem-equivalent* rate of protection implied by some specific tariff or subsidy, t_0, when the price is p_0^e, that is, $\tau_E = t_0/p_0^e$. Suppose that t_0 is chosen such as to provide the same amount of protection as some *ad valorem* rate, τ_0, when evaluated at the initial price, p_0^e. If t_0 is positive a lower price leads to larger protection as τ_E increases, while if t_0 is negative a lower price implies larger subsidization. Regardless of whether trade is taxed or subsidized, this implies that for all price lines steeper than p_0^e *specific* rate offer curves lie further away from the free trade offer curve than the equivalent *ad valorem* rate offer curves, while they lie closer to the free trade offer curve for all price lines flatter than p_0^e.[17] This implies that to the left of the free trade offer curve *AV* lies above the *specific rate Stackelberg locus*, *SP*, while *SP* lies above *AV* to the right of the free trade offer curve. It follows that the optimal *ad valorem* tariff welfare dominates the optimal *specific* tariff, while the optimal *specific* subsidy welfare dominates the optimal *ad valorem* subsidy.[18] [19]

The ranking between the the optimal tariff and the optimal minimum import requirement depends upon monopoly cost and home trade indifference curves. When monopoly cost is constant, the minimum import requirement implements the first best trade. When monopoly cost is increasing, instead, it is possible that welfare corresponding to the optimal tariff at point J in figure 6, exceeds welfare at the optimal minimum import requirement corresponding to point C. This would be the ranking if the *ad valorem Stackelberg locus* is sufficiently concave. Figure 3 (b) illustrated how the minimum import requirement, leading to point C, fails to implement the first best trade when monopoly cost is decreasing. It does dominate the optimal tariff, however, since any *tariff Stackelberg locus* necessarily lies to the right of π_0.

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[17] Horwell (1966) showed, for the case of tariffs only, that the *ad valorem* tariff offer curve is more elastic than the *specific* tariff offer curve.

[18] This discussion was stimulated by Brander and Spencer (op. cit., p. 235): "A natural question to ask concerns whether a specific or ad valorem tariff is welfare superior. We have found this difficult to answer in general, although we can work out special cases." The ranking presented here has now become generally accepted. It appears in Kowalczyk (1986, 1988) and in Helpman and Krugman (1989).

[19] It follows also from figure 5 that a tariff is better than an import quota since both the *ad valorem* and the *specific Stackelberg loci* lie to the left of the free trade offer curve and, therefore, to the left of quota point, B. This result is originally due to Shibata (1968).

Proposition 5. *When monopoly cost is constant or decreasing, the optimal minimum import requirement welfare dominates the optimal tariff. The reverse ranking may hold when monopoly cost is increasing.*

As in result 4, increasing monopoly cost offers to the home country an opportunity to trade off a smaller trade volume in return for better terms of trade thereby making policies such as the entry fee and the tariff more attractive as compared to the minimum import requirement.

The relationship between the tariff and the price ceiling is illustrated in figure 7 for constant cost. Thus suppose point J represents the trade implied by the optimal *ad valorem* tariff. At this point, a tariff-distorted offer curve, O_τ, is tangential to an iso-profit locus. Announcing the price ceiling equal to the price implied by OJ leads to a point K, which lies on, or to the left of, the free trade offer curve which is not drawn. Whether K defines a kink on the offer curve, as in the former case, or whether it is a point of tangency between the linear segment of the offer curve and an iso-profit locus, as in the latter, K yields a larger volume of trade than does point J.[20] Hence the *price-ceiling Stackelberg locus* lies strictly above the *ad valorem Stackelberg locus* and the following result is implied:

Proposition 6. *The optimal price ceiling welfare dominates the optimal tariff.*

Any price obtainable by the use of a tariff can be obtained by use of a price ceiling, and with less distortion. Thus for price ceiling equilibria on the free trade offer curve the price differs from marginal cost, but the domestic price equals the terms of trade and the consumption distortion is eliminated. For price ceiling equilibria on the concave part of the *price-ceiling Stackelberg locus* (not drawn) the domestic price differs from the terms of trade implying a consumption distortion, but price equals marginal cost thus eliminating the monopoly distortion. The tariff eliminates neither of these distortions.

[20] This argument holds for increasing and decreasing cost as well.

4. Conclusion

Recent years have witnessed extensive research on trade policy under imperfect competition. Much of this work has ignored income effects, and often functional forms have been assumed. While the latter leaves as controversial the robustness of any policy conclusions, the former renders difficult any reconciliation of the newer findings with those of the substantial literature on trade policy in general equilibrium. This paper has addressed these issues for the problem of trade policy for a nation trading with a foreign monopoly firm.

The paper has presented a diagrammatic technique that incorporates income effects and that easily dispenses with the widely used assumption of constant marginal cost. Indeed, by introducing iso-profit curves in trade space the paper has extended the tariff retaliation literature and has demonstrated that this literature completely encompasses the new literature on trade policy and foreign monopoly.

The methodology as well as the new results presented in the paper tap several themes. First, it is noteworthy how increasing cost repeatedly overturns rankings derived under constant and decreasing cost. While the minimum import requirement is incapable of taking advantage of the curvature of the monopoly cost function (its optimal value is always defined by the point of intersection of the free trade offer curve with the zero-profit curve) both the price ceiling, the entry fee, and the tariff can utilize that a lower import volume can generate lower cost and thus lower price.

The theory of commercial policy has quite consistently deemed tariffs a lesser evil than quotas, a view supported by the findings in this paper regarding the newest of quantity-setting policies, the voluntary import expansion. More generally, the analysis suggests that any commitment to a trade volume, in the absence of control over price, is a highly risky proposition. This in turn has the immediate and strong policy implication that in a world of imperfect competition orderly marketing agreements must go further than specifying quantities or market shares, as the terms of trade cannot be left to the market but must be addressed at the bargaining table.

Looking further yet, with continued international integration any use of trade policy will become increasingly difficult, and direct bargaining over quantities and prices become increasingly relevant. In a world where information is costly and bargaining requires skills it

may even be in a community's interest to have a private firm undertake these activities. The theory of public goods represents an outstanding tradition of comparing the efficiency of the government to that of private agents. Drawing iso-profit curves rather than trade indifference curves barely scratches the surface of the problem of characterizing institutions for the optimal provision of protection.

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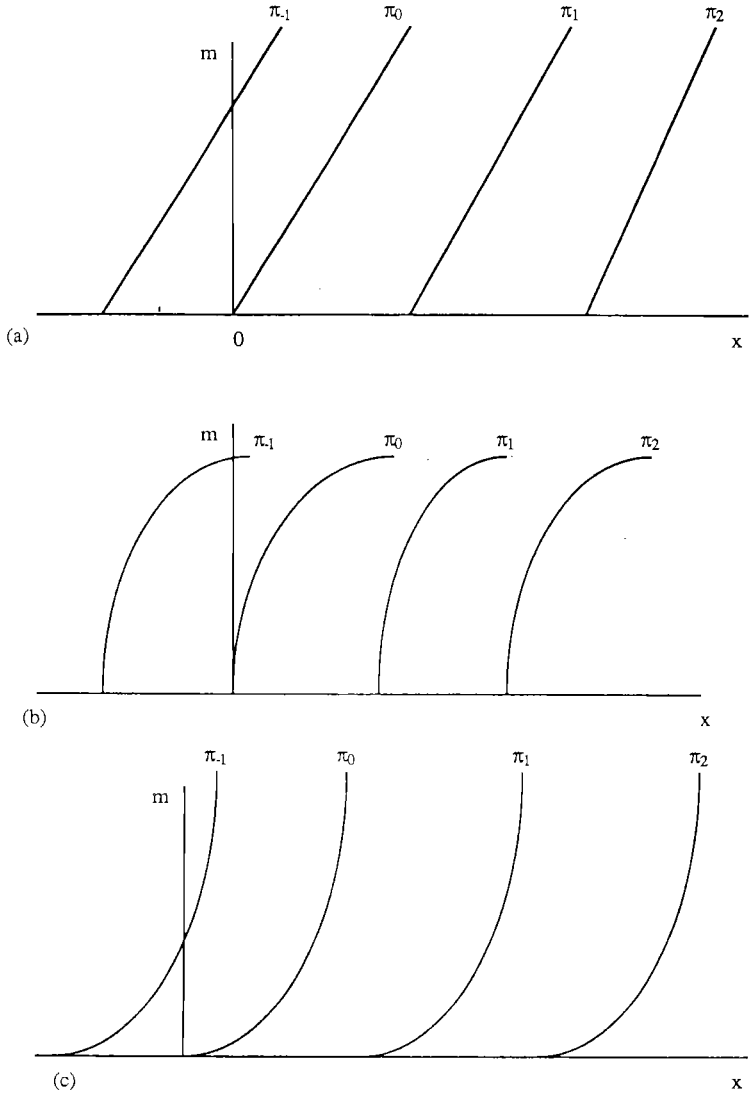


Figure 1

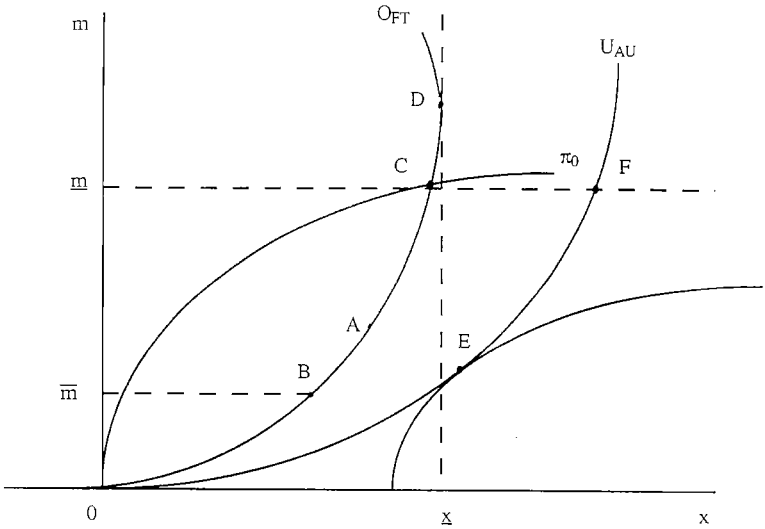


Figure 2

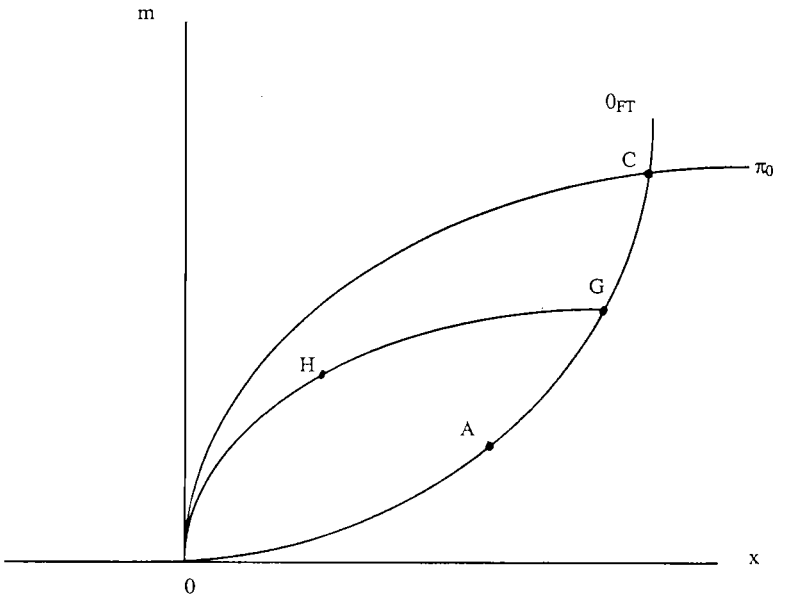
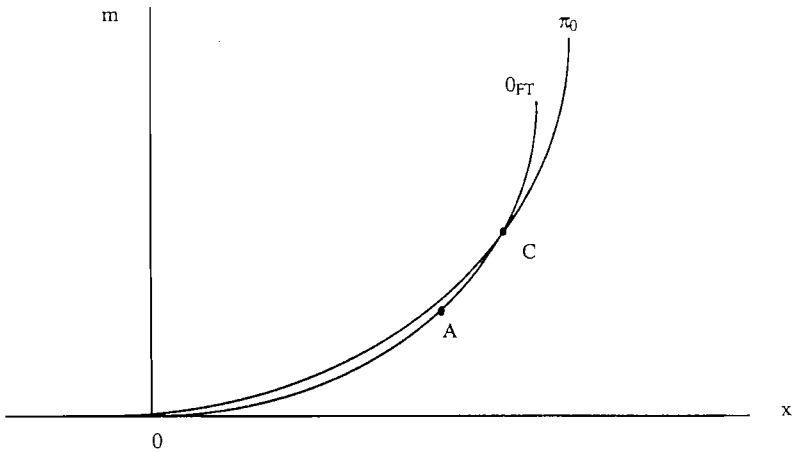


Figure 3 (a)



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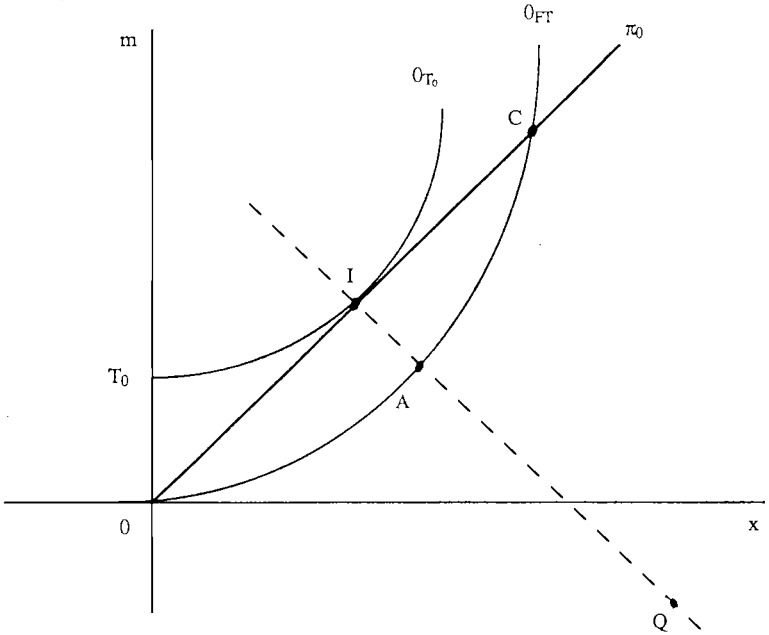

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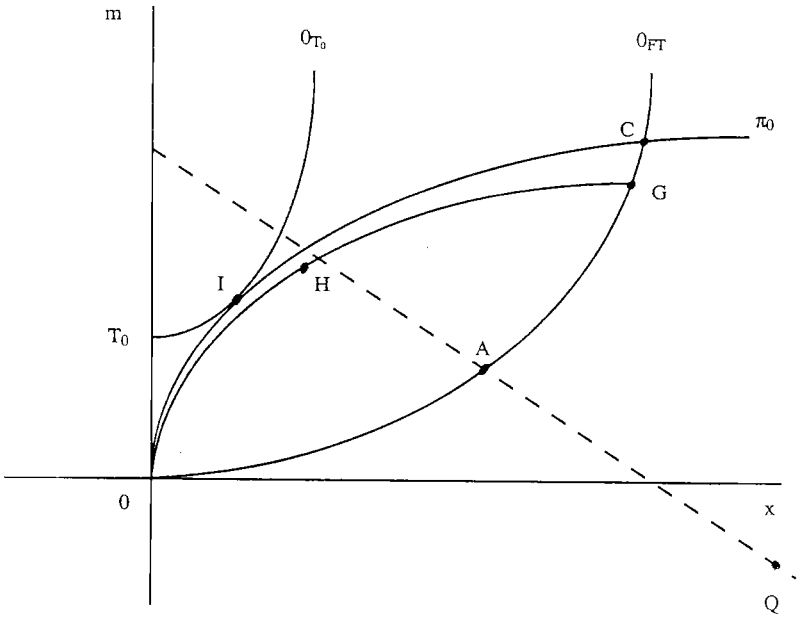

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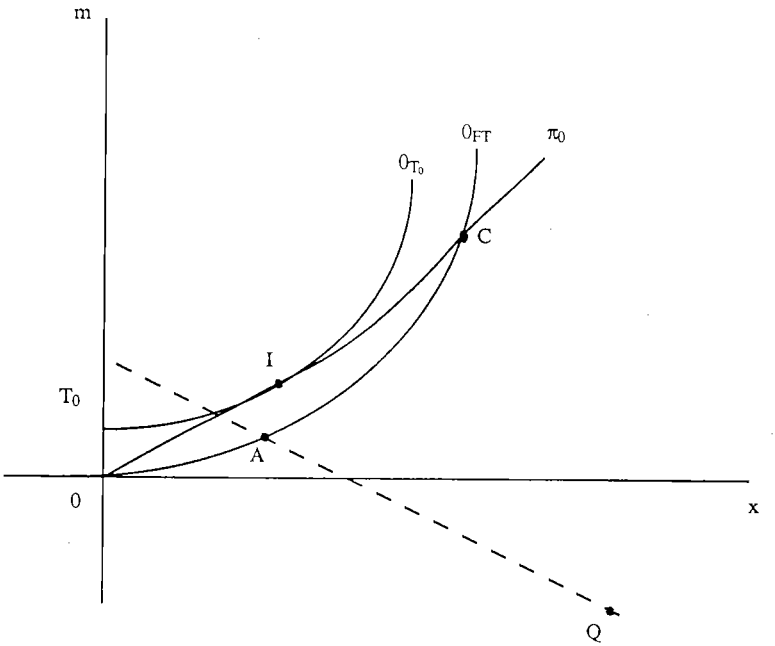

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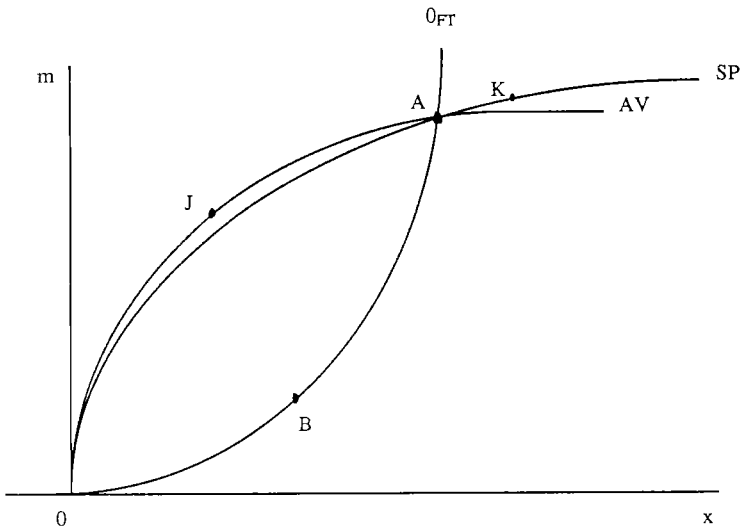

Figure 5

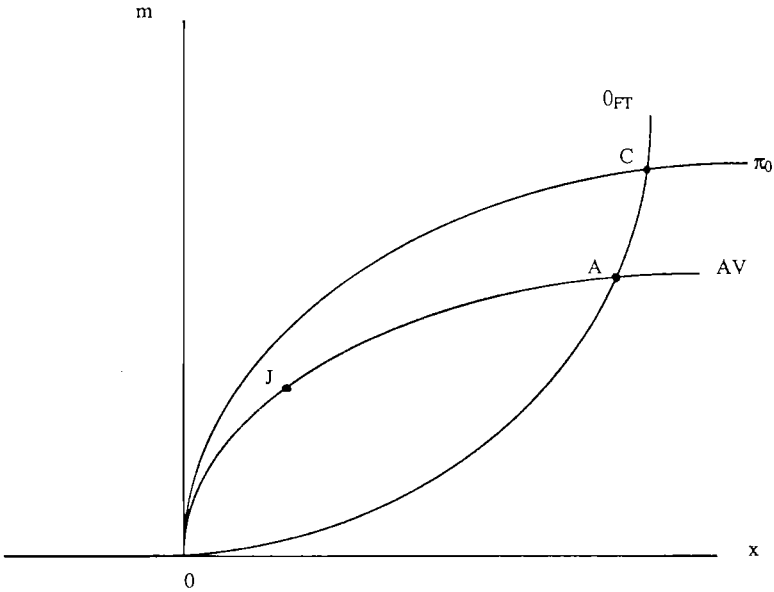

Figure 6

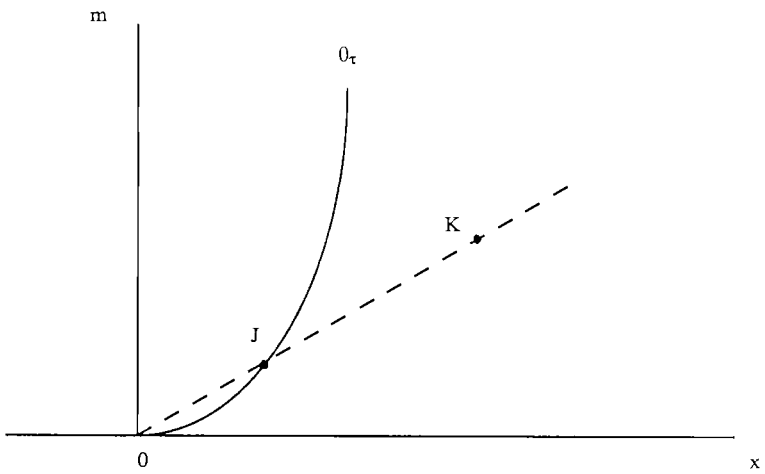

Figure 7