THE IMPORTANCE OF TRANSFER PRICING:

A Microeconomic Theory of Multinational Behaviour Under Trade Barriers

by

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Chapter III

INTRAFIRM TRADE UNDER TARIFF BARRIERS

Introduction

The Sharing of the Benefits from Intrafirm Trade

The previous chapter demonstrates that a profit-maximizing multinational enterprise, unconstrained by trade barriers or pricing regulations, will increase worldwide efficiency in the sense that marginal rates of transformation are equalized across countries. The welfare of the exporting country will be increased but this may be at the expense of a decline in welfare in the importing country. With regard to the groups affected by the intrafirm trade flows, the monopolist gains higher profits but the gains to consumers and factors are ambiguous.

If, as seems possible, most of the gains accrue to the multinational in the form of monopoly profits, governments are likely to intervene to redistribute the gains to themselves, to factors and to consumers. The host country cannot expect to capture the total gains of the multinational within its own country without government intervention since the monopoly profits constitute part of the national gains of the home country. Although the profits earned by the MNE in the host country may represent a fair return for the investment in knowledge undertaken by the corporation, the host government may fear that the profits are excessive and exploitive. It may therefore intervene to increase its share of the trade gains.

This point has also been made by Jack Behrman:

But it seems clear that the operations of MPE's do create
a particular sharing of its contributions to economic growth
and stability. Some countries gain more than others.
The distribution of these gains is determined according to
the decisions made by the managers as to location of production,
produced mix, technological processes, location of R & D
efforts, trade and marketing patterns, pricing, and financial
flows. The enterprises would prefer to make these decisions
without regard to diverse governmental interests and will
do so whenever they can....If governments do leave the enter-
prise free to operate across national boundaries without
constraint they are, in effect, accepting the distribution
of benefits as decided by the managers. But governments
remain concerned over the distribution of the gains, and
few are willing to accept a division of international
welfare determined by the decisions of the MPE's, even if
their share might be larger than it otherwise would be.
They are concerned not only with the efficiency and the size
of their share but also with their participation in the
determination.[1]

Both home and host governments have interfered in the deter-

mination of the total gains and the division of gains between countries.

These total gains include both the benefits from the original investment

and from intrafirm trade. Mikesell outlines three areas in which govern-

ments have attempted to alter these benefits:[2] 1) the division of profits

from operations of the MNE, 2) the determination of export prices, output

and other conditions affecting total revenues, 3) the domestic impact of

foreign company operations on other sectors of the economy, on national

income and the Balance of Payments. He notes that not only may the division

of revenues be a source of conflict but also the principle of maximization

of net revenues. Host governments would prefer that subsidiaries and

branches behave as individual profit-maximizers. The behavior of the

1. J. H. Behrman, "Government Policy Alternatives and the Problem of
   International Sharing," in J. H. Dunning, The Multinational Enterprise,
   1971, pp. 292-3.
2. R. F. Mikesell, "Conflict in Foreign Investor-Host Country Relations:
   a Preliminary Analysis" in R. F. Mikesell et al., editors, Foreign
   Investment in the Petroleum and Mineral Industries, 1971, pp. 29-55.

affiliate, however, will be to maximize not its own profits but the net income of the multinational enterprise as a whole. This may involve higher prices, smaller outputs or lower profits in the host country than would occur in the absence of trade.

One of the traditional policy tools used by governments to increase their country's share of the gains from trade has been the tariff. If a country can alter its terms of trade without retaliation, tariffs can redistribution trade gains in favor of the importing nation, stimulate growth and employment, and redistribute income internally in favor of the protected industry and the factor used intensively in that industry. This argument in favor of tariffs is outlined in the next section.

Tariffs and the Distribution of the Gains from Trade

This analysis borrows heavily from Kenen's[3] discussion of tariffs. By levying a tariff on imports a large country can alter the international terms of trade in its favor, gaining reduced import prices at the expense of some fall in total consumption (assuming the exporting country does not retaliate).

3. P. B. Kenen, "The Use and Abuse of Tariffs," in R. D. Hays, C. M. Korth, M. Roudiani, International Business, 1972, pp. 82-88.

Figure III.1

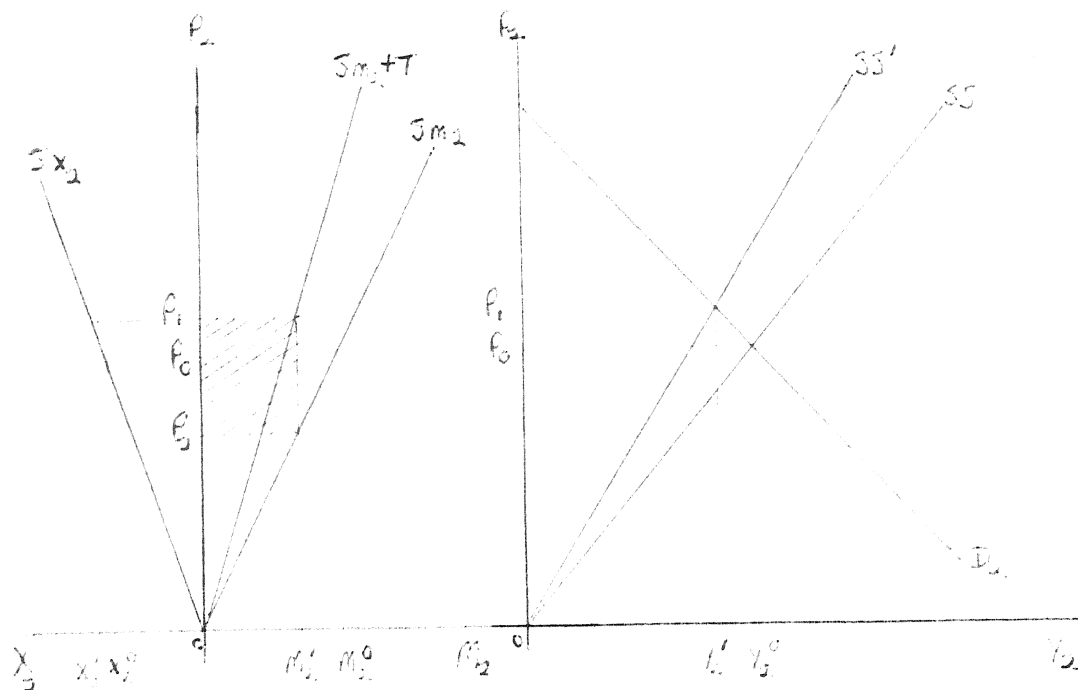THE IMPACT OF A TARIFF ON FIRM 2's IMPORTS

Figure III.1 in the left diagram, shows the domestic (Sx_2) and

foreign (Sm_2) supply curves of a particular good, and, in the right

diagram, the domestic demand curve and horizontally summed total supply

curves. Initially the home country consumes Y_2^o at P_o; obtaining X_2^o from

domestic sources and M_2^o from imports. The world and domestic prices for

the commodity are the same. The home government then levies a tariff on

imports which causes the import supply curve to shift to $Sm_2 + T$ and the

aggregate supply curve to rise to SS^1. This causes domestic sales to

decline to Y_2^1 and the price to rise to P_1. Domestic production increases

to X_2^1 while imports fall to M_2^1. The total price of imports is P_1 of which

P_2 is the price paid to the foreign suppliers and $P_1 - P_2$ is the tariff

revenue paid by the importer. Although the consumer price is higher and

sales less, the country has obtained its imports at a lower cost, increased

its domestic production and generated tariff revenues for the government. The home country has captured a larger share of the gains from trade. Within the home economy the protected industry hires more factors and if factor markets are not perfect the tariff can raise incomes and employment.

In applying tariffs governments have usually assumed international trade consists primarily of transfers between unrelated buyers and sellers. The price at which trade occurs will be an arm's length price--a price negotiated on the basis of demand and supply between firms maximizing individual profits. In such cases, the trade price will fairly accurately reflect the value added by each party involved. In intrafirm trade, however, the transfer price may bear no relation to value added. Transfer prices are set internally within the MNE in such a way as to maximize global profits. When the corporation is faced by tariff barriers it will attempt to minimize tariff costs by setting low transfer prices. This, in effect, shifts the supply of imports curve on which the tariff is based. As a result the price paid to foreign suppliers may not decline as predicted by the traditional tariff model. Transfer prices, therefore, have an important role to play in determining the total gains from trade and the distribution of these gains under tariff barriers.

The Role of Transfer Pricing

According to Business International: "The most complex aspect of pricing in international operations involves the determination of transfer prices for intercorporate sales, particularly when the separate corporations are domiciled in two or more countries."[4] Transfer pricing

4. Business International Corporation, Solving International Pricing Problems, 1965, p. 18.

is a complex problem because any price must fulfill seven requirements.

It must:[5]

1) provide a fair profit to the producer.

2) enable the purchaser to meet profit targets.

3) permit management to compare and evaluate the performance of the
    various divisions.

4) reduce administrative costs.

5) be acceptable to tax authorities.

6) be acceptable to customs authorities.

7) provide control over foreign subsidiaries so profit targets are met.

Due to the large number of requirements Business International

states that only four transfer pricing systems are acceptable:[6]

1) pricing at arm's length or an established price to unrelated customers.

2) prices negotiated between divisions.

3) local manufacturing cost plus a markup.

4) local manufacturing cost of the most efficient division plus a markup.

An arm's length price is the transfer pricing policy preferred

by most governments. Arm's length pricing should allow each trading

party a fair return on his investment and represent a "fair market value."

Where both parties are perfect competitors an arm's length price will

award each party the value added by his services. Where one or both

parties are monopolists, however, "fair market value" is more difficult

to define. The United States Treasury has outlined three standards that

can serve as tests of arm's length prices:[7]

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5. Business International, p. 18.
6. Business International, p. 18.
7. U.S. Treasury, Section 482, "Allocation of Income and Deductions
    Among Taxpayers," 1968, page 32, 229.

1) comparable transactions with unrelated buyers.

2) uncontrolled resale price less a markup comparable to that made by the buyer in similar uncontrolled purchase and resale transactions.

3) full standard cost plus a markup reflecting the allocation of operating margin between buyer and seller.

In the model of the previous chapter where the parent firm exports goods to the international division an arm's length charge according to the first test would be P_1, the price at which the parent firm sells the same product to unrelated customers. Under the second test the transfer price would be P_2, the resale price, minus a discount. The problem with the resale method is that firm 2 does not purchase the good from outside parties, only from firm 1, so there are no comparable uncontrolled sales. Under the third test full standard cost would be AC_1 plus a markup reflecting the profit margin made by the seller on uncontrolled sales. The allowable transfer price under the third test would therefore be $AC_1[1 + (P_1 - AC_1)]$.

A study of 130 multinational enterprises[8] concluded that most companies try to apply the arm's length standard in international transactions. However, most actually use cost-plus or negotiated prices depending on the availability of the product to the buying division from outside sources. If the good can be purchased externally negotiated transfer prices are used. If no outside sources are available cost-plus pricing is followed. Business International also reports that most firms construct a transfer price based on factory cost, with or without the addition of indirect, administrative or R & D costs.[9] Most international

8. J. Greene and M. Duerr, <u>Intercompany Transactions in the Multinational Firm, A Survey</u>, The Conference Board, 1970, p. 21.
9. Business International, p. 9.

divisions are organized as profit centers. For this reason, transfer prices tend to be arm's length charges, according to Brooke and Remmers.[10] Since transfer prices affect the allocation of profits among divisions an arm's length charge allows both buyer and seller to make a profit margin. Where transfer prices are set for other reasons profits can become a meaningless indicator of performance.

Transfer prices may be fixed or variable. A variable price fluctuates with changes in output (AC_1) or sales (P_1). A fixed or posted price is set at a level (for example P_1) and price changes are discontinuous and infrequent. Duerr[11] notes that several companies complain that the U.S. Internal Revenue Service expects rigid application of a transfer pricing formula regardless of changing conditions. Executives feel that transfer prices should be freely variable when market conditions vary. Posted or fixed prices were a common transfer pricing policy for petroleum multinationals. In the 1950's the oil companies signed 50/50 taxation arrangements with the OPEC countries.[12] The companies posted a uniform world-wide f.o.b. price for crude oil. The companies and OPEC agreed on the costs and 50 percent of the net profit was taxable by OPEC. The companies, however, sold the crude oil at less than the posted price to their affiliates. The posted price remained stable for several years while the price of refined petroleum products fluctuated with market conditions. The oil companies found it more and more difficult to maintain the posted price as market conditions changed and did succeed in renegotiating new posted prices. This

10. M. Brooke and H. L. Remmers, The Strategy of Multinational Enterprise: Organization and Finance, 1970, p. 117-118.
11. M. G. Duerr, Tax Allocations and International Business, The Conference Board, 1972, p. 60.
12. E. T. Penrose, The Large International Firm in Developing Countries, 1968, pp. 69, 177.

illustrates the difficulty of maintaining a truly fixed transfer price. Generally, prices will vary with market conditions but probably not as smoothly or quickly as is assumed in this dissertation.

One of the seven requirements of a workable transfer pricing policy is that it be acceptable to customs authorities. Since this chapter studies the effects of tariff barriers on intrafirm trade it is perhaps useful to outline the Canadian and United States tariff regulations as they apply to intrafirm transfers.

Canadian Customs in section 36 of the Customs and Excise Act[13] requires that all imports be priced at fair market value in the exporting country. This value is the price at which goods are sold to purchasers at arm's length at the same trade level as the importer and in the same quantities for home consumption under competitive conditions in the exporting country. If the goods are valued at less than foreign fair market value dumping charges can be levied on the company. In terms of our model if the Canadian firm is firm 2, the importer, the transfer price acceptable to Canadian customs would be P_1, or a price somewhat less than P_1 since firm 1 is a monopolist in its domestic market. Business International[14] notes that approximately half the firms inter- viewed reported that customs authorities in Canada, Latin America , the United Kingdom and the E.E.C. refused to accept transfer prices less than arm's length distributor prices and had revalued their prices from 10-50 percent of the invoiced price. Duerr[15] states that Canadian customs valuation is considered an acceptable transfer pricing policy by the U.S.

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13. Department of National Revenue, Customs and Excise, Memorandum D43, Ottawa, March 20, 1972, "Information for Exporters to Canada," pp. 7-8.
14. Business International, p. 23.
15. M. G. Duerr, p. 30.

Internal Revenue Service but that it may not be acceptable to Canadian income tax authorities since the high import price reduces profits (and therefore income taxes) of the Canadian subsidiary. Another important facet of the Canadian Customs Act is the treatment of branches compared to subsidiaries. According to the Tax and Trade Guide: Canada[16] Canadian branches are not required to pay foreign fair market value for imported goods. Canadian customs do not consider transactions between foreign parents and Canadian branch plants to be sales so that any transfer price may be charged without leading to an antidumping charge. This peculiar regulation means that subsidiaries must pay foreign fair market value while branches could conceivably pay a zero transfer price. Where tariff barriers are high and the affiliate a large importer tariff costs could be considerably reduced by altering the form of business organization from a subsidiary to a branch.

In the United States dumping charges may be levied if the imported price is less than the factory price to consumers in the country of exports. If less than 25 percent is sold domestically the test is the factory price for exports to countries other than the U.S.[17] The United States also has special tariff provisions. One such provision is the American Selling Price (ASP) basis of valuation for certain chemical imports.[18] The basis for tariff valuation is the price prevailing in the U.S. market (ie., P_2, in our analysis). This price is generally higher than the price the exporters charge and therefore affords more protection to the U.S. industry. Another special provision is sections

16. Tax and Trade Guide: Canada, 3rd Edition, Arthur Anderson and Company, August 1973, p. 16.
17. R. Robinson, International Business Management, 1973, p. 125.
18. S. H. Robock and K. Simmonds, International Business and Multinational Enterprises, 1973, p. 109.

806.30 and 87.00 stating that articles assembled abroad using U.S. components only pay duty on the value added abroad rather than the total value of the good.[19] Higher transfer prices for the U.S. components result in low U.S. tariffs that encourage U.S. firms to assemble components abroad rather than at home.

Similar tariff provisions were applied by the EFTA countries.[20] The tariff was based on the percent of value added to products imported from outside and then transferred among the members. If less than 50 percent of the value was added internally a duty was applied. This encouraged low transfer pricing to the EFTA subsidiary in order to raise the value added by the subsidiary.

In summary, transfer prices are often set in response to external pressures on the multinational enterprise. Where tariffs are levied on imports the MNE attempts to lower the transfer price in order to escape the duty. In response to this practice many customs authorities now demand arm's length pricing. This pricing results in higher tariff duties but it can distort the behavior of the MNE in its output, sales and consumer pricing decisions. The standard analysis of tariffs may not hold when transfer pricing is involved. Therefore, having outlined the problem, let us turn to the model itself.

19.   D. Robertson, "Trade Flows and Trade Policy," in J. Dunning, editor, The Multinational Enterprise, 1971, page 185.
20.   E. Kolde, International Business Enterprise, 1968, p. 408.

Profit Maximization Under the Tariff

Assumptions

The assumptions of Chapter II are maintained: the MNE consists of two horizontally integrated firms producing identical final products in different countries. The firms can engage in trade and can price discriminate between markets. This chapter also assumes that country 2 levies a tariff on all imported goods at an ad valorem rate 'r'. Firm 2 must therefore pay rPm_2M_2 to its government in tariff payments.[21] If the transfer price is constant the per unit tariff will not vary with the volume of trade. However, a variable transfer price will be affected by trade flows. In general, the corporation will attempt to minimize tariff costs by setting a low transfer price. If this is prevented by government action or other constraints intrafirm trade may decline, cease, or even increase.

Profit Maximization with a Fixed Transfer Price

When there are no trade barriers the transfer price does not affect total profits or the allocation of resource inputs between the firms. Under a tariff, however, both profits and resources are affected by the transfer price. Since this price affects the gains from trade and the division of these gains both governments will be keenly interested in the reactions of the MNE to the tariff.

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21. It is possible that the price charged by firm 1 for its exports will not be accepted by the tariff authorities and they then set a higher or lower price. Firm 2 then pays Pm_2M_2 to firm 1 and $rPm_2'M_2$ to the tariff authorities where Pm_2 and Pm_2' differ. In order to simplify the analysis assume that the tariff rate includes this readjustment of transfer prices so that Pm_2 is the price charged by firm 1 and rPm_2 is the per unit tariff cost where r is adjusted for discrepancies between the internal price and the price accepted for tariff purposes.

As shown in Appendix III.1 the first order condition for profit maximization with a fixed transfer price is $MR_1 + rPm_2 = MC_1 + rPm_2 = MR_2 \Rightarrow MC_2$. The transfer price only enters into the condition when it is the price of exports from country 1. When firm 2 is the exporter the tariff does not apply and therefore the condition for profit maximization is the same as the no trade barrier one : $MR_1 = MC_1 = MR_2 = MC_2$. Since we are interested in the effect of the tariff on trade, initially the exporter is assumed to be the first firm.

The tariff can be viewed as a composite of (a) a tax on all of firm 1's output and (b) a simultaneous, equal subsidy on that part of that output that is sold within country 1. Alternatively , it can be viewed as a composite of (a') a tax on all of firm 2's sales , and (b') a simultaneous, equal subsidy on that part of such sales that is met from production within country 2. If we view it in this alternative manner the profit condition could have been written as $MR_1 = MC_1 = MR_2 - rPm_2 = MC_2 - rPm_2$.

Figure III.2 illustrates the effect of the tariff on output, sales, and prices of the two firms. Joint profits are initially maximized where $MR_1 = MC_1 = MR_2 = MC_2$, that is, where the summed MC and summed MR curves intersect. Firm 1 produces OX_1^o , selling OY_1^o in the domestic market for P_1^o and selling $X_1^o - Y_1^o$ to firm 2 at Pm_2. Firm 2 produces OX_2^o , imports $Y_2^o - X_2^o$ from firm 1, selling the total for P_2^o . The tariff can be interpreted as shifting the MR_1 and MC_1 curves vertically upward by rPm_2. The new summed MR curve is found by horizontally summing the $MC + rPm_2$ and MC_2 curves. Where these two summed curves intersect fulfills the two necessary conditions for profit maximization : 1) all

output is sold, 2) $MR_1 + rPm_2 = MC_1 + rPm_2 = MR_2 = MC_2$. This new inter-section may lie to the right, to the left, or directly above the old intersection. The conditions under which output and sales expand, or contract are examined in Appendix II.3.

The new allocation of output can be found by horizontally running across from the intersection of $\Sigma MR'$ and $\Sigma MC'$ to the MC_2 and $MC_1 + rPm_2$ curves. The allocation of sales is found by tracking back to the $MR_1 + rPm_2$ and MR_2 curves. The tariff causes firm 1's domestic sales to expand (tariff acts as a subsidy to sales) and output to decline (tax on output). Firm 2's sales contract and output expands. The volume of intrafirm trade declines. Consumers pay a lower price for the product in country 1 and a higher price in country 2. The shaded area abM_2' represents the tariff paid to the government of country 2. This revenue is smaller than the revenue that the MNE would have paid (the area cdM_2^o) had it ignored the effect of the tariff on profits and not altered its allocation decisions.

The tariff is, apparently, non neutral with respect to the overall profit-maximizing output/sales decision of the international corporation. It also changes the location of production and sales decisions. Specifically, it encourages an expansion of output in country 2, combined with a reduction in aggregate sales, hence reducing 2's import demand. The reflection of these changes in firm 1 is that its exports decline, with domestic sales increasing and domestic production declining. From an output viewpoint the effect of the tariff is to encourage the corporation to undertake greater productive activity in country 2. From a sales viewpoint the tariff causes a reallocation of total sales in favor of country 1.

Figure III.2

Profit Maximization With a Fixed Transfer Price Under a Tariff Barrier
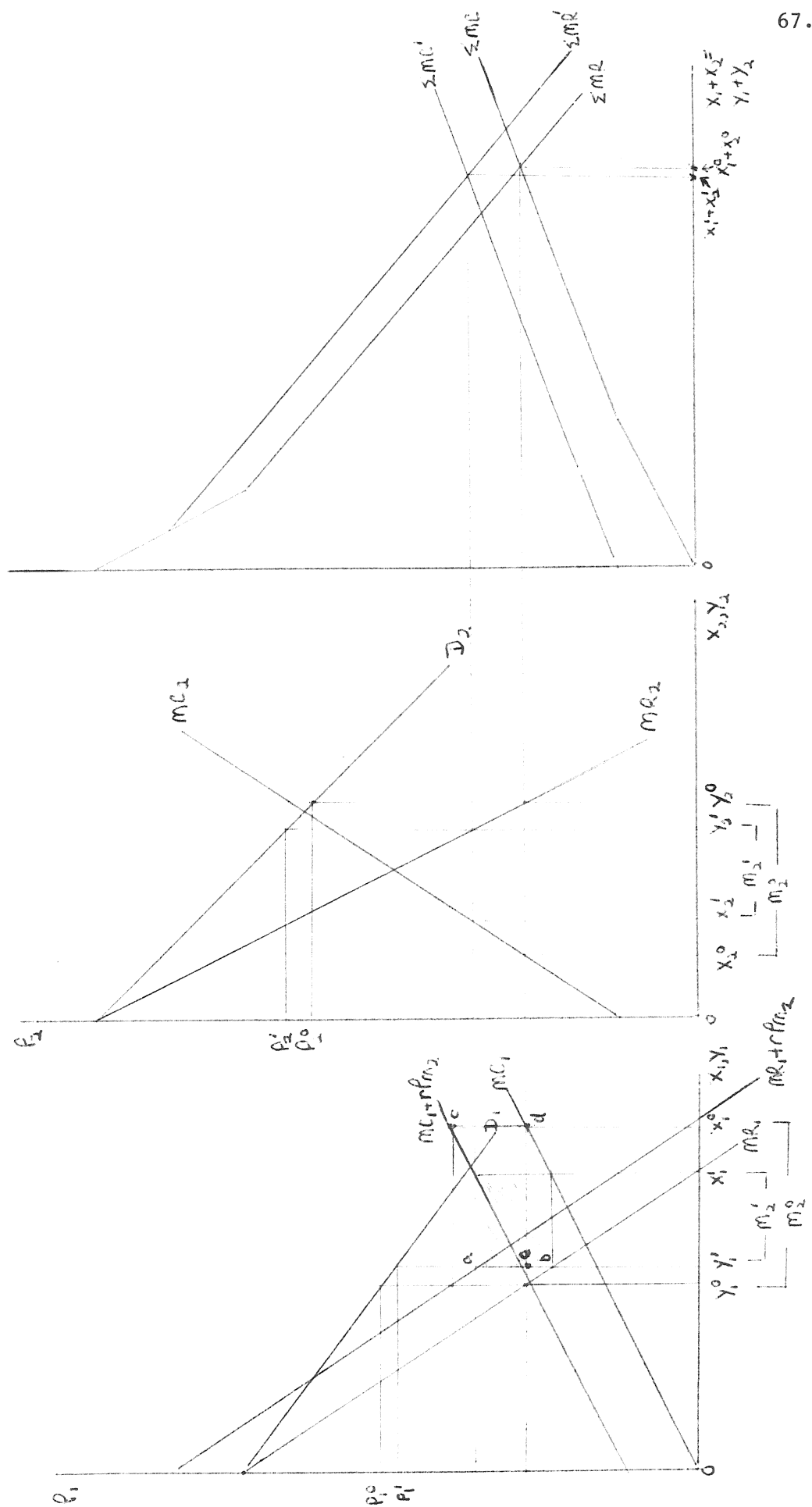
Comparing these results with the results of the standard argument in favor of tariffs (see Figure III.1) we note that, in both cases, the importing country sells less at a higher price; produces more domestically and imports less. Part of the tariff costs are shifted to the exporter so that his return falls to Pm_2 minus "eb" in Figure III.2. Firm 2 pays the remaining tariff cost "ea" plus Pm_2. By shifting part of the tariff incidence onto firm 1 country 2 manages to obtain its imports at a lower cost. If firm 1 reduces its transfer price in order to avoid the tariff, the costs to country 2 fall further. The lower the transfer price the smaller the upward shifts in MR_1 and MC_1 and therefore the less disturbance to the initial distribution of output and sales.

If the customs authorities insist on an arm's length transfer price the shifts in MC_1 and MR_1 are larger. The volume of trade contracts further and trade may cease altogether. This prohibitive tariff causes trade to cease when the intersection of $MR_1 + rPm_2$ with $MC_1 + rPm_2$ occurs at or above the level where MR_2 and MC_2 intersect. At this level firm 1 is no longer the 'low-cost--low revenue' firm. However, since the tariff only applies when trade flows from 1 to 2 trade cannot reverse direction due to the tariff. The MNE, if under no constraints, would prefer a zero transfer price since this minimizes tariff cost.

Profit Maximization with Variable Transfer Prices

This section discusses the effects of setting variable as opposed to fixed transfer prices on output, sales, and prices of the MNE.

Variable transfer prices may be set for many reasons. Customs authorities may require that imports be valued at the price the exporter sells in the home market to unrelated customers, at fair market value in

the port of origin. That is, the transfer price is based on P_1 when firm 1 is the exporter and therefore varies with Y_1. Or the transfer price may be valued as the price of similar goods in the country of destination, at the importing country's market price. In this case this would be P_2 and would therefore vary with Y_2. If firm 1 is treated as a service center for firm 2 average cost pricing of exports may be used. This has two effects: the transfer price varies with X_1, and all trading profits are declared by the importing firm. Marginal cost pricing will allocate some profits to each firm if costs are increasing. As seen in the introduction, variable transfer pricing is common business practice. Although price changes may be discrete changes and infrequent a study of continuous price changes can yield some useful insights that may not be too far from the truth. Since many governments now require that transfers take place at 'fair market value' probable effects of these laws on the MNE and on the countries involved should be studied.

Five variable transfer prices were chosen in order to illustrate the effects of the tariff on intrafirm trade. These particular prices were chosen as representative of actual business practices and government regulations. These prices are (1) P_1 (2) P_2 (3) AC_1 (4) MC_1 (5) AC_2. The transfer price might be set at the level of market price in either the exporting or importing country because tariff or tax laws require this. The price might be based on average cost in either firm if either is a service center. Marginal cost pricing might be used as a measure of incremental costs of output expansion.

When $Pm_2 = AR_1$ the profit-maximizing condition becomes (see Appendix III.1) $MR_1 + rAR_1 - rM_2 \, dAR_1/dY_1 = MC_1 + rAR_1 = MC_2 = MR_2$. Figure III.3 illustrates the effect of the tariff on intrafirm trade flows when

Pm_2 equals AR_1, the domestic selling price in the exporting country.

There are basically two tariff effects involved. The first we may call

the "ad valorem effects" because the shifts in the MR_1 and MC_1 curves

vary with the transfer price. Two processes occur simultaneously in the

ad valorem effects:

1) MR_1 shifts up by rAR_1. As Y_1 declines AR_1 rises and the new and old

MR_1 curves therefore intersect directly below where AR_1 cuts the X_1 axis.

2) MC_1 shifts up by rAR_1. In the no tariff situation the firm equates

MR_1 with MC_1 to determine maximum profits. Therefore to determine the

appropriate AR_1 for any level of MC_1 set MC_1 equal to MR_1 and pinpoint

the level of sales where MR_1 equals that level of MC_1. This sales level

determines AR_1. r percent of this level of AR_1 is then added to the

initial level of MC_1 to give a point on the new $MC_1 + rAR_1$ curve.

Since MR_1 and MC_1 curves intersect at $X_1 = Y_1$, and the curves both shift

up by rAR_1 the new intersection of $MR_1 + rAR_1$ with $MC_1 + rAR_1$ lies directly

above the old intersection. These two shifts therefore reduce exports by

raising the intersection of the MR and MC curves of firm 1 (assuming no

changes in firm 2's curves).

The second tariff effect we may call the "rotation effect"

because it causes the average revenue curve to rotate about the point

where no trade occurs. Due to the rotation effect MR_1 shifts up by

$-rM_2 dAR_1/dY_1$ since $dAR_1/dY_1 < 0$. Since M_2 equals $X_1 - Y_1$, M_2 can be

measured as the distance between the MR_1 and MC_1 curves at any level

where $MR_1 = MC_1$. At the initial intersection of the MR_1 and MC_1 curves

M_2 equals zero so the new MR curve rotates through the new intersection

point. Above the initial intersection X_1 exceeds Y_1 and so MR_1 rotates
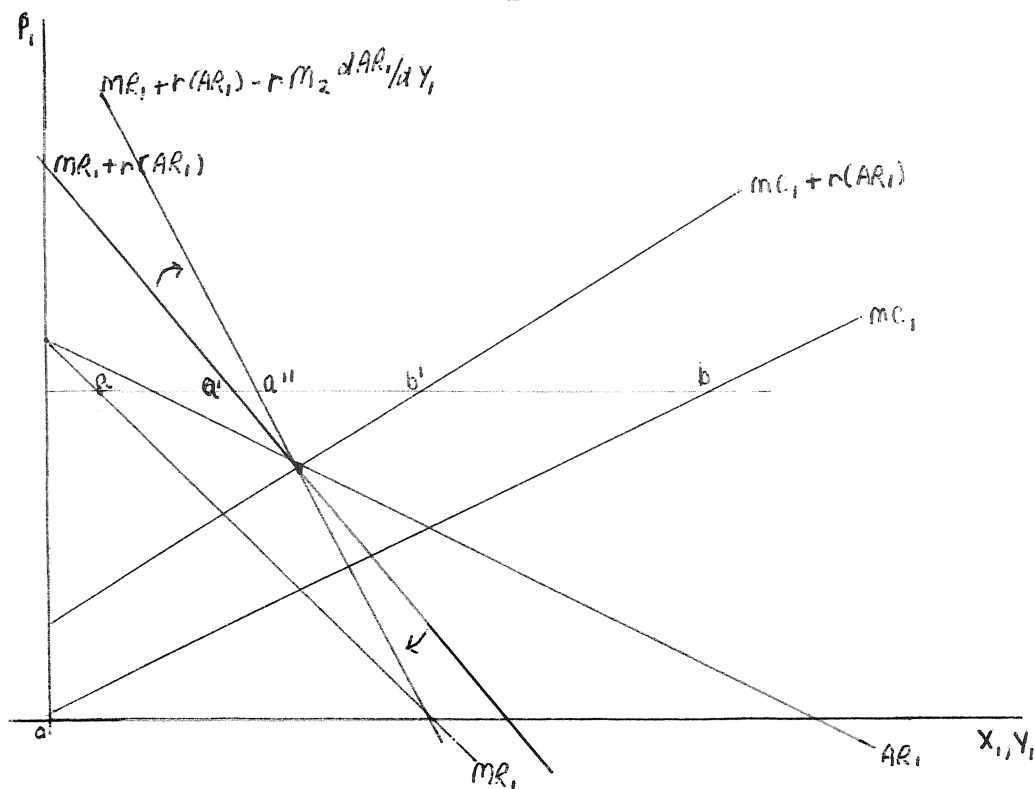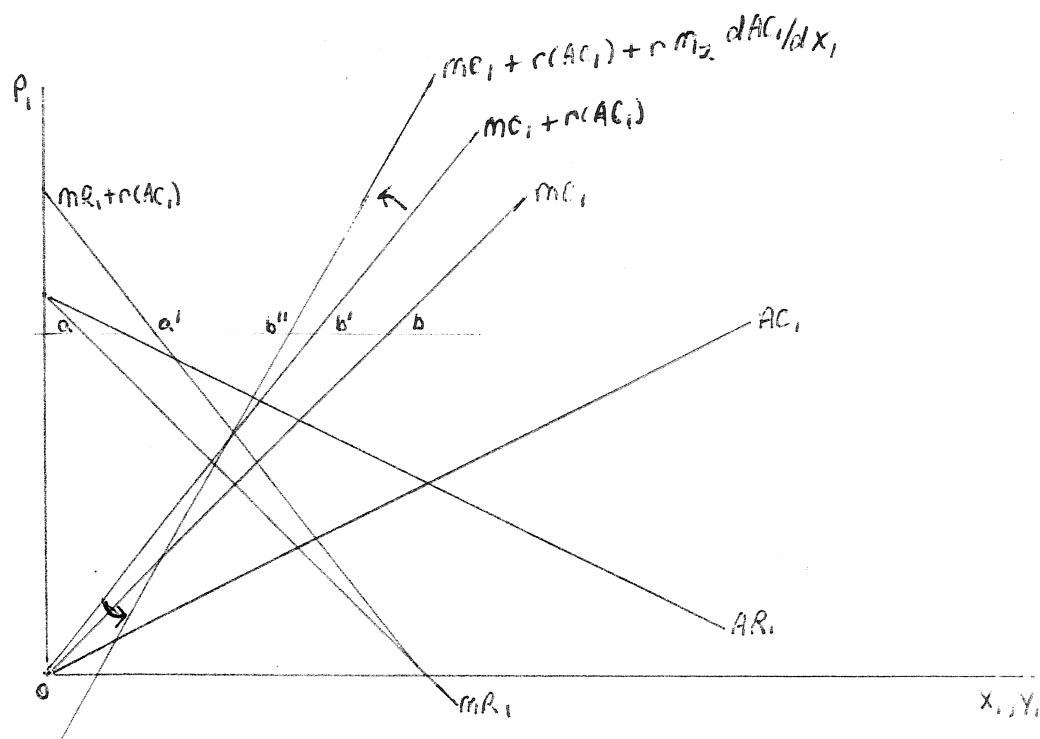
71.

Figure III.3

Profit Maximization With $Pm_2 = AR_1$ Under a Tariff Barrier

Figure III.4

Profit Maximization With $Pm_2 = AC_1$ Under a Tariff Barrier

upwards. Below the initial intersection Y_1 exceeds X_1 and so MR_1 rotates

downwards. That is, this third shift is a clockwise rotation of the MR_1

curve through the new intersection point.

Setting Pm_2 equal to AR_1 therefore has two effects:

1) It reduces exports by shifting the intersection of the new MR_1 and

MC_1 curves vertically upward.

2) At any level where MR_1 equals MC_1 exports are reduced. For example

before the tariff in Figure III.3 exports were $X_1 - Y_1$ or ab. Now they

equal a''b' - a smaller amount.

The explanation of these effects is fairly straightforward.

By raising the effective costs of units produced for trade, the tariff

(as in the fixed transfer price situation) induces the firms to engage in

less trade. In the particular case considered here, this general effect

is compounded by the fact that reductions in trade actually reduce the

effective per unit tariff payment. This is because as trade contracts,

the transfer price is lowered i.e. the volume of trade and the trade price

are positively related. There is, then, an unambiguous tendency for trade

to contract. This result applies, in qualitative terms, to all cases in

which the transfer price is positively related to the intrafirm trade

volume. Transfer prices based on cost of the exporter, such as AC_1 or

MC_1, also generate these results.

Figure III.4 illustrates the shifts in MR_1 and MC_1 when the

transfer price equals AC_1 and the profit-maximizing condition is:

$MR_1 + rAC_1 = MC_1 + rAC_1 + rM_2{}^{dAC}1/dX_1 = MR_2 = MC_2$. Again there are

two basic shifts:

1) The ad valorem effects cause MC_1 to shift up by rAC_1 (which is a

counterclockwise rotation through the MC_1 curve where AC_1 equals zero)

and MR_1 to shift up by rAC_1. To determine the appropriate level of AC_1 for any MR_1 set MR_1 equal to MC_1 and note the volume of output where this occurs. Then reading from the AC_1 curve at this output level determine the value of rAC_1 and add this to the initial level of MR_1. The new intersection of the MR_1 and MC_1 curves will lie directly above the old intersection by the distance rAC_1. The tariff therefore reduces exports by shifting the intersection of the MR_1 and MC_1 curves upward.

2) MC_1 rotates in a counterclockwise fashion through the new intersection point. The third shift is $+rM_2 dAC_1/dX_1$ where dAC_1/dX_1 is positive, and M_2 is positive where X_1 exceeds Y_1, zero where the MR_1 and MC_1 curves intersect, and negative where Y_1 exceeds X_1. This rotation reduces exports at any level.

Setting $Pm_2 = AC_1$ therefore has the same basic effects as setting the transfer price equal to AR_1: the intersection is higher, and at any level exports are reduced (in this case from ab to a'b''). Again the reason for these results is the positive relationship between the export price and the volume of exports. Since the transfers occur at average production cost no profits are declared in firm 1 on trade and the price for tariff purposes is low. Therefore the ad valorem export reducing effect is less than in the AR_1 case. Note in Figure III.4 the shift in the intersection of MR_1 and MC_1 is less in the AC_1 case. (rAC_1 compared to rAR_1)

With a transfer price equal to MC_1 the profit-maximizing condition is: $MR_1 + rMC_1 = MC_1 + rMC_1 + rM_2 dMC_1/dX_1 = MR_2 = MC_2$. When the transfer price equals MC_1 both MR_1 and MC_1 shift up by rMC_1 and MC_1 rotates in a counterclockwise fashion. Therefore the intersection is higher and exports are reduced at any level since the export price-volume relationship is positive. Also the net shift upward is equal to rMC_1, which lies

between the shift rAR_1 in the first case and the shift rAC_1 in the second case. Transfer prices are somewhat higher when marginal cost pricing is used than when average cost pricing is used, and lower than when average revenue pricing is used.

A different set of circumstances applies when the transfer price is negatively related to trade volume, as it would be if it were equated to selling price in the importing country (AR_2) or to costs in the importing country (MC_2 or AC_2). The basic disincentive to trade due to the tariff persists. But if the transfer price declines as trade expands (and vice versa) there is a distinct incentive to at least minimize trade contraction. In some cases it may clearly be profitable to actually expand trade to take advantage of the lower effective per unit tariff payment. For example, if the transfer price is set equal to price in the importing country (AR_2) the condition is: $MR_2 - rAR_2 + rM_1 dAR_2/dY_2 = MC_2 - rAR_2 = MR_1 = MC_1$. The marginal cost and revenue curves of firm 2 shift down by rAR_2 which is import reducing. However, MR_2 rotates in a counterclockwise fashion through the new intersection which tends to increase domestic sales (and therefore imports) at each level. The net effect on trade at any level where MR_2 equals MC_2 is therefore ambiguous. This is because setting $Pm_2 = AR_2$ implies a negative relationship between export price and export volume. If M_2 increases both Pm_2 and P_2 decrease as sales of Y_2 expand. This inverse relationship tends to increase imports by firm 2.

Similarly setting $Pm_2 = AC_1$ implies an inverse relationship and therefore, although the new intersection of MR_2 and MC_2 is lower and

discourages trade, at any level $MR_2 = MC_2$ there are opposing effects on imports. In some ranges the tariff may increase trade; in others, reduce trade.[22]

In summary, the choice of the transfer pricing system is crucial since it results in different directions of effects on trade and influences the magnitude of the trade change. When AR_1 pricing is followed the ad valorem shifts in MR_1 and MC_1 are the largest (compared to AC_1 or MC_1) and therefore the most trade reducing. The AR_1 rotation effect may be larger or smaller than the AC_1 or MC_1 effects because this depends on the slopes of the curves involved. Comparing AR_2 with AC_2 and MC_2 the ad valorem effects are again strongest with AR_2 while the size of the rotation effects depend on the slopes of the curves. When the export price--export volume relationship is negative the tariff can cause trade expansion, not contraction as predicted in the traditional tariff models. In the AR_2, AC_2 and MC_2 cases the supply of exports curve is actually negatively sloped and this can cause perverse results.

One can also note that in comparing the effects of a fixed versus a variable transfer price, if the prices were equal before the tariff was levied, _ceteris paribus_, variable transfer prices such as AR_1, AC_1 and MC_1 will be more trade contracting than their corresponding fixed prices, and prices such as AR_2, AC_2 and MC_2 less trade contracting.

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22. The ad valorem revenue effect is $-rAR_2$ which must be compared with the rotation effect $+rM_1 dAR_2/dY_2$ to determine which is larger.

$$rAR_2 \gtreqless rM_1 dAR_2/dY_2$$

$$1 \gtreqless M_1/AR_2 \cdot dAR_2/dY_2$$

Since $dAR_2/dY_2 < 0$ and $M_1 < 0$ over the tariff range the net effect is ambiguous. In the AC_2 case comparing $-rAC_2$ with $+rM_2 dAC_2/dX_2$ yields a similar result (as does the MC_2 case.)

Support for these conclusions is given in an empirical study of United States exports to Canadian subsidiaries in 1963 written by Thomas Horst.[23] Horst's two significant findings are, first, that the technological intensity of the U.S. parent is more closely related to the sum of the parent's exports to Canada plus the domestic sales of its Canadian subsidiaries than to either exports or domestic sales. This supports the assumption of this dissertation that M_2 and X_2 are substitutes for one another. They are alternative means of supplying Y_2 and the choice between them will depend on real production costs and trade barriers. Horst notes that this is a modified version of the comparative-cost theory of international trade. His second major finding is that Canadian tariff policy has affected the MNE's choice between exports and subsidiary sales--the higher the tariff, the smaller the share of U.S. exports in total sales in the Canadian market. That is, the tariff does cause a reduction in trade flows. What is of interest from the viewpoint of transfer pricing is that the relation between the tariff and the export share is nonlinear. The fall in export share is much larger in response to an increase in a low tariff than in response to an increase in a high tariff. Horst hypothesizes that this could be caused by: 1) increasing marginal production costs of the subsidiary, 2) transfer pricing of imports at prices less than world prices, 3) the parent charging a high transfer price when the tariff rate is low and a low price when the tariff rate is high. This supports our view that multinationals can and do alter transfer prices in response to tariff rates in such a way as to minimize tariff costs.

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23.   T. Horst, "The Industrial Composition of U.S. Exports and Subsidiary Sales to the Canadian Market," The American Economic Review, 1972.

Factor Utilization Conditions

As shown in Appendix III.2 the tariff drives a wedge between MR_1 and MR_2. In the original, no-trade-barrier, situation the corporation equated MR_1 with MR_2. Now MR_2 is higher than MR_1 by the per unit tariff rPm_2 (assuming fixed transfer prices). Since MR_1 has declined compared to MR_2, the marginal productivity of labor and capital employed by firm 1 must have risen, and the productivity of labor and capital employed by firm 2 must have fallen since both firms face constant factor prices. That is, factors are released from firm 1 (output falls) and factors are hired by firm 2 (output expands).

If the supply of factors to the MNE is not perfectly elastic as factors are released from firm 1 their prices decline somewhat partially compensating for the full productivity rise in the perfectly competitive case. In firm 2 as output expands factor prices increase so that fewer additional factors are hired and therefore factor productivity does not fall as much. If the tariff results in a net expansion of total output and sales of the MNE the influence of the corporation in total factor employment in the two countries increases. If output and sales decline the MNE's influence on factor employment declines.

Since capital is perfectly mobile between the two countries the tariff does not affect the return to capital--Pk_1 still equals Pk_2 after the tariff. Under free trade the marginal productivity of capital was also equal in the two firms. However, the tariff raises the productivity of capital in firm 1 and lowers its productivity in firm 2 when the firms engage in trade. The new capital hiring condition becomes $rPm_2 = Pk(1/MPk_2 - 1/MPk_1)$. If the transfer price is zero or trade ceases the marginal capital productivities are equal. The higher the transfer price the more unequal the marginal productivities.

As Batra demonstrates, however, trade can only continue under the tariff if the goods moving across countries through repatriation of capital earnings are subject to the host country's tariff.[24] If the repatriated capital earnings are not affected by the tariff then international mobility of capital guarantees that the marginal productivity of capital must be everywhere the same. This can only be true if the tariff is zero and inoperative, that is, either trade must cease or the transfer price be zero. If the tariff does apply to capital movements goods mobility and capital mobility are not perfect substitutes. The tariff does cause increased capital movements but intrafirm goods trade also remains.

The Gains from Trade

Group Gains from Trade Under a Tariff

In Chapter II we discussed three gains from trade: producer, consumer, and factor gains. The tariff affects each of these gains, and also affects a fourth group that gains from intrafirm trade--the government levying the tariff. Let us examine each of these gains in turn.

The tariff barrier causes the producer gains from trade to unambiguously decline. This is illustrated in Figure III.5 assuming 1) fixed transfer prices,[25] 2) that the tariff does not cause any change in total output or sales of the MNE. Before the tariff the corporation produced where $MR_1 = MC_1 = MR_2 = MC_2$ at the level $a = b = a' = b'$. The tariff shifts MR_1 and MC_1 upward and the new curves are equalized at the

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24. R. N. Batra, p. 325.
25. Using a fixed transfer price simplifies the analysis of the gains from trade. This can be modified to incorporate qualitative differences under variable transfer pricing such as the possibility of trade expansion in the AR_2, AC_2 and MC_2 cases.

level $c = d = c' = d'$. Sales expand in firm 1 by $+\Delta Y_1$ and fall in firm 2 by $-\Delta Y_2$ where $+\Delta Y_1$ equals $-\Delta Y_2$ so that total sales are unchanged. Output rises in firm 2 and falls in firm 1 where $+\Delta X_2 = -\Delta X_1$ so total output is unchanged. If pure profits of the corporation expand the producer gains from trade under the tariff. That is, changes in total revenue and in total costs are the important factors in determining the producer trading gains.

There are two changes in total revenue. Firm 2 loses revenue as sales decline. This loss is measured by the area under MR_2 over the range $-\Delta Y_2$ or by $-ac\Delta Y_2$. Firm 1 gains total revenue equal to $+a'e\Delta Y_1$. Since $-\Delta Y_2$ equals $+\Delta Y_1$ and $a = a'$ and $c = c'$ there is a net fall in total revenue of the triangle $a'c'e$ to the MNE.

There are two changes in total cost. Firm 2 produces more output at increased costs of $+bd\Delta X_2$. Firm 1 produces less output so its costs fall by $-b'f\Delta X_1$. Since $+\Delta X_2 = -\Delta X_1$ total costs increase by the triangle $b'd'f$. That is, the redistribution of sales causes total revenue to decline and the redistribution of output causes total costs to increase.

There is a third decline in total profits caused by the redistribution of income to the government of country 2. This is the tariff revenue paid by the MNE equal to the rectangle $d'fec'$. So there are three losses in profits caused by the introduction of the tariff--the MNE unambiguously suffers losses. The total loss, however, will be smaller than the tariff costs the MNE would have paid if no changes in output or sales allocations had been made (area $a'ghb'$).

If the total volume of output expands in response to the tariff the fall in total revenue is somewhat smaller and rise in total cost

Figure III.5

Producer Gains from Trade Under a Tariff Barrier
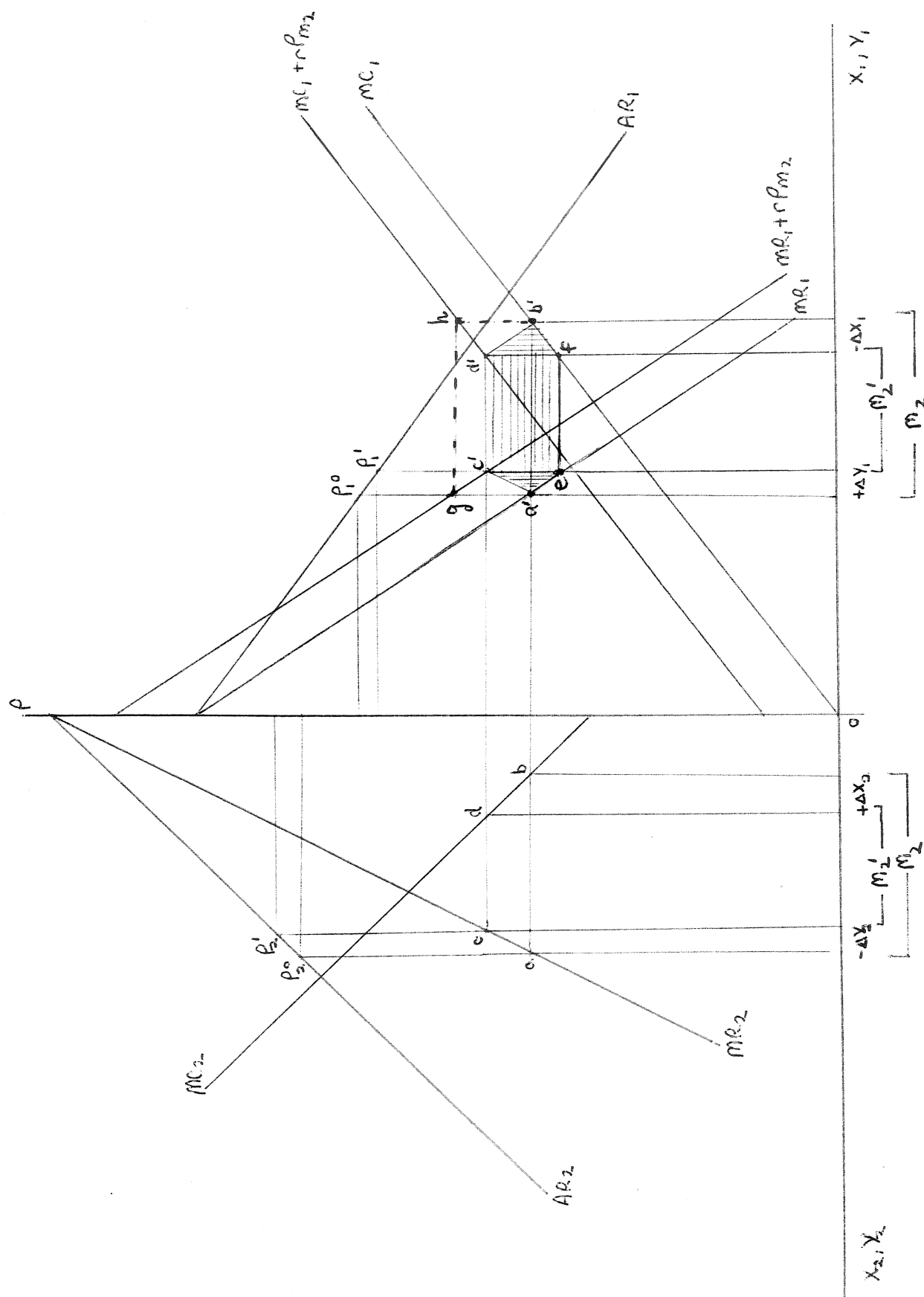
somewhat larger. If output and sales contract the fall in revenue is
somewhat larger and the rise in costs somewhat smaller. However, producer
gains still decline by more than the tariff revenue.

The second group affected by the tariff is the consumer group.
Consumers in country 2 suffer a loss in consumer surplus of $\Delta P_2 Y_2$ +
$1/2 \Delta P_2 \Delta Y_2$. Consumers in country 1 gain surplus of $\Delta P_1 Y_1 + 1/2 \Delta P_1 \Delta Y_1$.
Whether consumers as a group gain is ambiguous, depending on the demand
elasticities, the initial sales and price levels and the changes in prices
and sales.[26] Consumers are more likely to gain if total sales expand.

If factor markets are perfectly competitive factors as a group
are unaffected by the tariff and reallocation of resources. If factor
prices are affected, factor income changes will depend on 1) elasticity
of factor supply, 2) elasticity of factor substitution, 3) net factor
release from or hiring by the corporation.

The fourth group, government, unambiguously gains tariff
revenue of $rPm_2 M_2$ if Pm_2 exceeds zero and if trade does not cease. The
government by levying the tariff captures part of the producer's gain
from intrafirm trade and perhaps part of the consumers' gain.

The Distribution of the Gains from Trade

The transfer price in the tariff case affects not only total
trade gains but also the division of these gains between the firms and
between countries.

The tariff causes domestic sales expansion in the 'low revenue
market' (firm 1) by artificially raising the marginal revenue from
domestic sales compared to exports. Consumers in the low revenue market

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26. See footnote 19 in Chapter II.

gain from the increased sales while consumers in the high revenue market lose. Within each country consumers who spend a larger share of their incomes on Y_1 gain in proportion to their purchases of Y_1 while consumers of Y_2 lose in proportion to their purchases of Y_2. The higher the per unit tariff (that is, the higher is the transfer price or the higher the tariff rate) the greater the distortion of output and sales and the smaller the trade volume given fixed transfer prices. The smaller the volume of trade the larger are the gains to firm 1's consumers and the larger the losses to consumers of Y_2.

If factor prices are unaffected by the reallocation of output there are no changes in total country-wide factor incomes. Within each country firm 1 now employs less factors and firm 2 more factors. The higher the transfer price the greater the wedge between MR_1 and MR_2 and the greater the discrepancy in the marginal productivity of factors between firms. If factor prices are affected by changes in output the factor used intensively in the expanding firm gains absolutely and relatively in income as a result of the tariff. In the contracting firm the intensive factor loses absolutely and relatively.

The government of country 2 gains tariff revenue of rPm_2M_2. If the corporation reduces trade volume (this fall depending on the size of rPm_2) tariff proceeds may be less than inititally expected by the government. Depending on supply and demand conditions a small change in the tariff rate may cause proceeds to rise or fall. This import elasticity would be affected by the ability of the MNE to adjust the transfer price in response to a change in the tariff rate. A rise in the tariff rate may cause proceeds to decline because either volume falls

or the transfer price falls. The more vigilant the tariff authorities
the less likely is the MNE to vary the transfer price inversely with
the tariff rate.

The tariff also affects the division of producer's gains.
Before the tariff, firm 1's profits were $Y_1(P_1 - AC_1) + M_2(Pm_2 - AC_1)$.
The tariff causes Y_1 to rise and M_2 to decline. As Y_1 rises P_1 falls, and
as X_1 falls, AC_1 falls. If the average cost function is linear the fall
in P_1 is exactly matched by an equivalent fall in AC_1. (See Appendix
III.4.) The change in profits between the tariff and no tariff posi-
tions can be written as $\Delta Y_1(\Delta P_1 - \Delta AC_1) + \Delta M_2(Pm_2 - \Delta AC_1)$. Profits on
Y_1 therefore increase as Y_1 increases if the cost function is linear.
If AC_1 is an increasing function of X_1 the fall in AC_1 exceeds the fall
in P_1 and profits on Y_1 are larger than otherwise. Since the transfer
price is unaffected by changes in trade volume and AC_1 declines per unit
export profits increase. However, the volume of exports will probably
decline. Profits on M_2 may therefore rise or fall depending on whether
the per unit gain is offset by the fall in volume. The higher the initial
transfer price the higher the tariff and thus the more likely the fall in
volume, ceteris paribus, and the more likely a decline in export profits.
Also the larger the initial trade volume the more likely is a substantial
fall in exports and therefore in profits. Total profits of firm 1 may
rise or fall since profits on Y_1 increase while the change in profits on
M_2 is uncertain. The larger the share of M_2 in X_1 the more likely are
firm 1's profits to decline.

Firm 2's profits in the no trade barriers situation were $X_2(P_2 - AC_2) + M_2(P_2 - Pm_2)$. The tariff causes X_2 to rise (raising AC_2) and M_2
to fall (P_2 rises as Y_2 declines). If the average cost function is linear

the rise in P_2 is matched by an equal rise in AC_2. The change in profits between the two situations can be written as $\Delta X_2 (\Delta P_2 - \Delta AC_2) + \Delta M_2 (\Delta P_2 - Pm_2) - M_2^1 r Pm_2$. Profits on X_2 therefore increase if the cost function is linear. If AC_2 rises as X_2 increases per unit profits on X_2 decline. If imports decline P_2 increases, so that the change in $P_2 M_2$ is ambiguous. Firm 2's profits unambiguously fall by the tariff on imports. The larger the volume of trade after the tariff and the higher the transfer price the more likely is a decline in firm 2's profits in addition to tariff costs.

Therefore, while we can unambiguously declare that total corporate profits decline and actually decline by more than the tariff, we are unable to determine the division of profits between the two firms. This point is also made by Batra who notes that "a change in the relative commodity prices exerts a determinate influence on the real incomes of the primary factors but not on those of the monopolists. The same is true of the relative returns of the monopolists...the final result is indeterminate."[27] This is because as the relative prices change 1) output is reallocated between the two firms and 2) the demand elasticities change. As P_2 rises, X_2 rises and E_2, the price elasticity of demand increases. As P_1 falls X_1 and E_1 decline. The formula for the relative returns to the monopolists as given by Batra is:

$$\frac{TT_2}{TT_1} = \frac{P_2}{P_1} \cdot \frac{X_2}{X_1} \cdot \frac{E_1}{E_2} \quad {}^{28}$$

which is indeterminate.

27. R. N. Batra, page 296.
28. R. N. Batra, page 296.

Effects of the Tariff on

National Income and the Balance of Payments

The gains from trade under a tariff may be viewed in another light as contributions to the domestic and national incomes of countries 1 and 2.

The change in firm 1's contribution to country 1's domestic income is $\Delta P_1 \Delta Y_1 + Pm_2 \Delta M_2$. Revenue from domestic sales increases while revenue from exports declines, the net effect depending on the share of exports in total production. As output falls, less factors are hired so employment earnings generated in firm 1 decline. Pure profits rise or fall again depending on the ratio of M_2 to X_1.

The change in firm 2's contribution to country 2's domestic income is $\Delta P_2 \Delta Y_2 - Pm_2 \Delta M_2 + rPm_2 M_2'$. Revenue from sales declines while import costs fall. Tariff revenue of $rPm_2 M_2$ is paid to the government. Firm 2's contribution may actually increase although its profits decline. The firm's share in factor employment income rises.

National income includes income of residents earned within the country and remitted from abroad. Country 1's national income is affected by: 1) changes in factor prices, 2) changes in national profits. If factor prices fall as output of X_1 declines national income declines. Also since total corporate profits fall by more than the tariff, country 1's national income may be expected to fall since repatriated profits will be less, depending on the per unit tariff costs. National income of country 2 is affected by 1) changes in factor prices, 2) the amount of unrepatriated profits, 3) the tariff revenue, 4) whether there is any net inflow of capital from country 1 in response to output and price changes. If output increases cause factor prices to rise national income

rises. If there are more factor inflows, national income is reduced by the increased outflow of factor earnings. The amount of unrepatriated profits will depend on total profits of firm 2 after the tariff and any changes in the rate of repatriation. The tariff revenue is an unambiguous increase in the government's income.

The Balance of Payments between the two countries will be affected by 1) factor flows, 2) profit flows, 3) intrafirm trade flows. The volume and value of intrafirm trade may be expected to decline as the MNE attempts to avoid the tariff by lowering the transfer price and/or reducing the volume of trade. There may be increased factor flows in response to output and factor price changes, the direction of movement probably from country 1 to country 2. The profits flow from firm 2 will be reduced by more or less than the tariff revenue depending on whether the rate of repatriation is increased or not. In general country 1 can expect reduced earnings on intrafirm trade and profit flows and possibly increased earnings on factor flows. The tariff, as expected, harms the exporting country, that harm depending on the fall in trade and profits.

Conclusions

The transfer price has a role to play in affecting total gains from trade in addition to the distribution of these gains. Joint profit maximization under a fixed transfer price results in usually less trade and a reallocation of output and sales between the two firms, the size of these changes depending on rPm_2. The corporation would prefer to set a minimal transfer price since this minimizes tariff costs and also minimizes the distortion of resources. The MNE suffers a loss in profits in excess of the tariff costs because of this distortion. Consumers as a

group may gain or lose from the tariff. Consumers in the exporting country gain while those in the importing country suffer. If factor markets are perfectly competitive, factor incomes are unchanged by the tariff although factor allocation between firms is changed. If factor prices do change, factors in the importing country benefit while factors in the exporting country suffer. The government gains tariff revenue through capturing part of the MNE's profits. The Balance of Payments of country 1, the exporter, worsens. Under variable transfer prices there is either a positive or negative relationship between export price and the volume of exports. The tariff is export reducing in the AR_1, AC_1 and MC_1 cases since the $Pm_2 - M_2$ relationship is positive. But trade volume may actually increase if transfer prices based on AR_2, AC_2 or MC_2 are used. The ad valorem effects are uniformly trade reducing but the rotation effect may be either trade creating or trade contracting.