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James R. Melvin

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DOMESTIC EXCHANGE, TRANSPORTATION COSTS AND INTERNATIONAL TRADE*

1. Introduction

The theoretical international trade literature, in order to focus attention on the exchange of commodities between countries, has abstracted from the purely domestic transactions that are implicitly assumed to take place. Individual countries are usually treated as if they were single economic units with unique excess demand and supply vectors. This simplification has resulted in a neglect of the relationship between transactions carried out among domestics and those carried out between domestics and foreigners. The purpose of this paper is to show that the failure to explicitly examine the variables which influence economic units in their decisions as to whether they will trade with other domestics or with foreigners may result in misleading conclusions. The main focus will be on the demand side of the model, for it is here that the issues are most obvious. It will also be seen that the introduction of domestic transportation costs when combined with domestic taste differences may have important implications for the standard model.

Demand conditions have always played a rather minor role in international trade discussions. One approach has been to assume that the economy behaves as a single individual, or more formally that a community utility function exists. The conditions for the existence of such a community indifference system are now well known.[1] Another approach has been to make no specific assumption about domestic demand and to concentrate attention on questions of when Pareto superior situations can be found, as in the gains from trade arguments. Here it is shown that with an appropriate redistribution

of income all consumers can be made at least as well off as they were in autarky.[2]

There have been several papers which have taken explicit account of the possibility that demand conditions may differ within a country. The first of these were articles by Peter Kenen (1957) and (1959) and Harry G. Johnson (1959). These were mainly concerned with demonstrating that the offer curve could be derived for cases in which demand conditions differed among individuals in an economy. V. S. Rao (1973) has examined the Stolper-Samuelson Theorem in terms of a model in which there are, in the domestic economy, two groups of consumers with different tastes.

More recently J. N. Bhagwati and R. A. Brecher (1980) and R. A. Brecher and J. N. Bhagwati (1981) have analyzed the consequences of foreign-owned factors of production on several of the standard trade propositions. Their model is explicitly in terms of two distinct groups of domestic residents, but because of the particular focus of their papers, namely foreign ownership, it is differences in factor endowments of these two which are emphasized. In the present paper attention is focused on taste differences, and endowment differences among domestic consumers are abstracted from. An additional difference between this paper and those of Bhagwati and Brecher is the issues addressed, for while they were concerned with foreign ownership, transfers, economic growth and tariff policy, attention here is focused upon the comparison of tariffs and taxes, and the interaction between tariffs and transportation costs.

On the production side our model is the standard one; there are two goods, X and Y, produced with labour (L) and capital (K) under conditions of constant returns to scale. The two factors are in fixed supply for the economy. Thus we have

$$X = F_x(K_x, L_x) \tag{1}$$

$$Y = F_y(K_y, L_y) \tag{2}$$

$$\bar{K} = K_x + K_y \tag{3}$$

$$\bar{L} = L_x + L_y \tag{4}$$

These give the standard production possibility curve TT' of Figure 1. On the demand side we have two groups of consumers with tastes identical and homothetic within the group but differing between groups, and with utility functions

$$U_i = U_i(X_i, Y_i) \qquad i=1,2. \tag{5}$$

Each group has an endowment of capital and labour, L_i and K_i such that $\Sigma L_i = \bar{L}$ and $\Sigma K_i = \bar{K}$. For any given point such as A on TT' of Figure 1, the indifference curves for consumer 1 can be plotted from 0 and for 2 from A giving the contract curve OBA. In what follows reference to "consumer 1" should be interpreted as meaning the group of consumers whose tastes are represented by consumer 1, and similarly for consumer 2.

One aspect of this model which is seldom taken advantage of in the trade literature is the link between the demand and the supply side formed by the condition that each individual is constrained in his role as consumer by the quantity of the two commodities he receives as factor payments for the provision of capital and labour to the two industries. In a competitive situation he receives his marginal product in quantities of X and Y depending on to which industries he sells his services. The value of the bundles of commodities he receives will be a function only of the commodity price ratio, although the specific endowment point will, in most cases, be indeterminate. Because of the importance of this point to the subsequent analysis it is worthwhile considering the various possibilities.

Figure 1

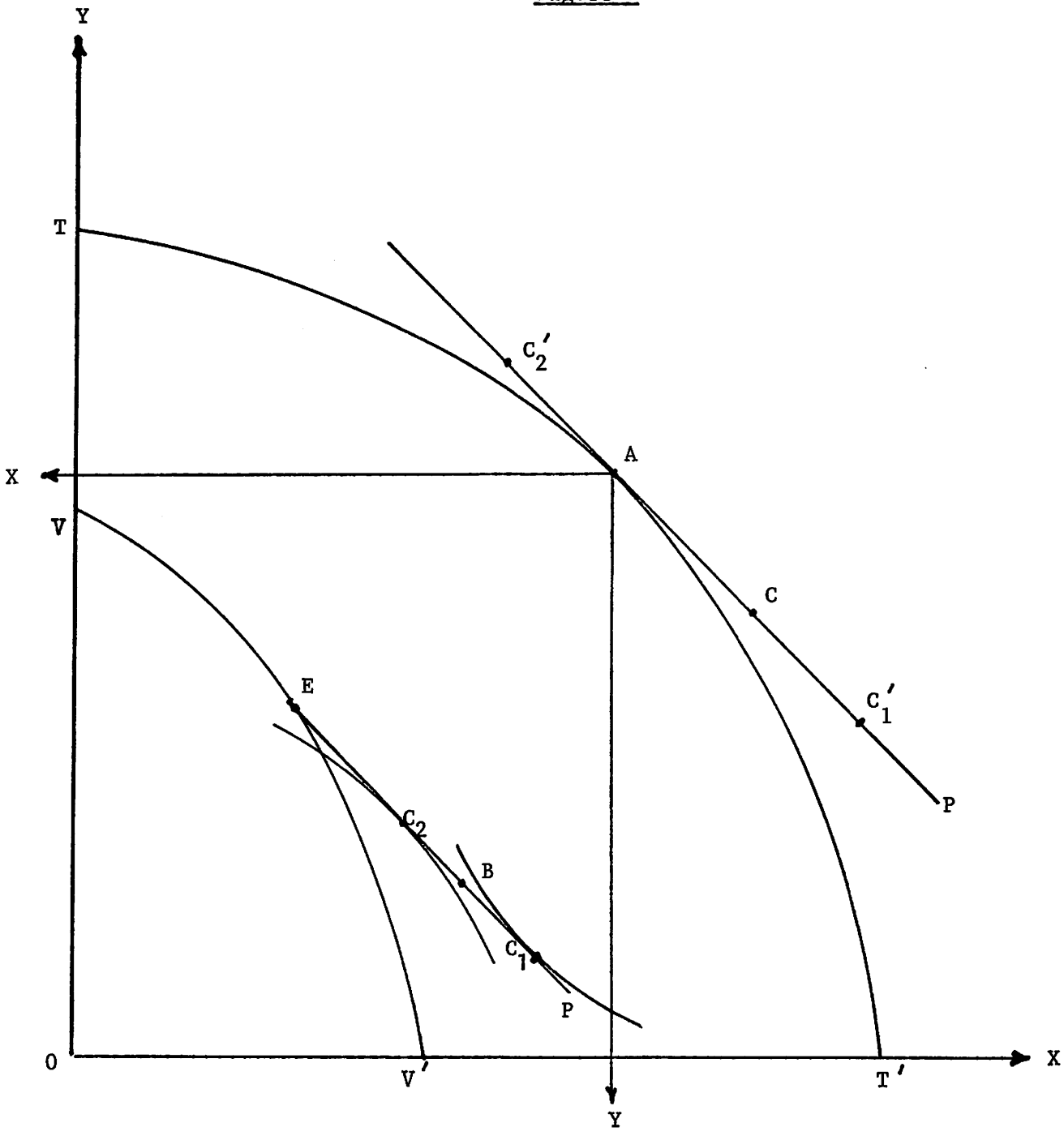

Figure 1

The simplest case occurs when each of the two consuming groups has only labour or capital services to supply. Here labourers will receive a share of the total production of X and Y depending on their marginal products, and similarly for capitalists. Note that this will yield a unique endowment point such as E in Figure 1. For A to be an equilibrium production point we must have a price line P tangent to the PPC at A. This same price line through E will allow the determination of excess demands and supplies associated with this price. If the equilibrium consumption points for consumers 1 and 2 are C_1 and C_2, respectively, then C_1C_2 is the vector of net domestic excess demands and supplies. Thus if C_1C_2 (or the identical vector AC) can be obtained through trade, price line P can be a trading equilibrium. Note that the vector AC gives one point on the offer curve for this country, and that the entire offer curve can be constructed by considering all relevant price lines and following the procedure of Figure 1. Thus the derivation of an offer curve and the determination of a trading equilibrium is seen not to depend on the existence of community indifference curves.[3] Furthermore this procedure easily extends to more consumer groups.

In Figure 1 there will, of course, be a different endowment point for each different commodity price ratio, and the locus of these points, VEV′, can be constructed.[4] Note that there is a one-to-one relationship between points on TAT′ and VEV′, which we will call the factor endowment frontier, and that in general there will not be a tangency between the price line and VEV′.

II. Domestic Demand and International Trade

The traditional concentration on models where the economy acts as if there is a single consumer has neglected the important role that purely domestic exchange may have in determining international equilibria. If consumers differ, either with regard to their tastes or with regard to their endowments (or both) then in general we would expect to observe intranational as well as international trade in any equilibrium, and it then becomes important to determine precisely who trades with whom. We have, in other words, the possibility that domestic and foreign trade may, under some circumstances, be substitutes for one another. One of the hypotheses of this paper is that such phenomena as cross-hauling, and the role of transportation costs, cannot be fully understood unless the model takes into account the role played by trade among domestic consumers. Furthermore, it will be argued that conclusions about the effects of tariffs, quotas and taxes may be different when such domestic trade is considered.

Implicit in the usual discussion of trading situations of the kind shown in Figure 1 is the assumption that the second individual will trade the vector EC_2 with the first individual and that the first individual, as well as engaging in this amount of domestic exchange, will reach equilibrium by trading with the rest of the world to move from point C_2 to point C_1. However, equilibrium could also be achieved if both individuals trade only with the rest of the world. Thus the second individual could export X and import Y so as to move from point E to C_2, while individual 1 exports Y and imports X, trading the vector EC_1. Here the economy exports and imports both commodities, and the total volume of trade is no longer the difference between the excess demands and supplies of the two individuals, but is instead equal to the sum. Thus the observed trade flow would be the vector

$C_2'C_1'$, which we will call gross trade. AC, the trade vector from the traditional model, we refer to as net trade. The real-world phenomenon of the same commodity being both imported and exported, referred to as cross-hauling, is sometimes thought to be at variance with the theoretical model in which we have an export good and an import good. We see, however, that this apparent conflict is easily resolved if attention is focused on the total volume of domestic trade rather than just on the net foreign trade vector.

In a completely frictionless world there is no way of choosing between the case where domestic individuals trade first among themselves and then satisfy their joint excess demands through trade with the rest of the world, and the case where all domestic consumers reach an equilibrium through trade only with foreigners, or the infinite number of possibilities between these two. In practice there are frictions such as transportation costs and transactions costs, and these would be expected to determine which of the two types of trade predominates. For transactions costs an important consideration will be whether the volume of trade or the number of transactions is the important variable. If it is costly to engage in more transactions rather than less, and if the physical volume of trade is not important, then transactions costs would tend to generate a situation in which all trade is carried out with foreigners. In this case there are only two transactions, while if trade is first carried out domestically, there are three. It is of interest to note that in this model minimizing the number of transactions maximizes the volume of trade.

The role of transportation costs will depend on whether the transportation costs between domestic consumers differ from those between domestic consumers and foreigners. If transportation costs internationally are greater than they are domestically, then the traditional result where the volume of

international trade is equal to the difference between domestic excess supplies and excess demands would be expected. It is quite conceivable, on the other hand, that international transportation costs may be less than they are domestically. In a country such as Canada where the population is spread in a thin band from one coast to the other, and where markets in the United States are likely to be closer than similar-sized markets in Canada, domestic transportation costs will often exceed international transportation costs. Thus both in the theoretical models with no frictions and in models where domestic transportation is important we could observe cross-hauling, and so we have:

<u>Proposition 1</u>: The observation of a country both importing and exporting the same commodity is perfectly consistent with the neo-classical, two-sector trade model.

The cross-hauling shown in Figure 1 depends on the fact that domestic consumers have excess demands for different commodities at the trading equilibrium. Thus if the factor endowment frontier of Figure 1 were such that E was between C_2 and C_1 both consumers would have excess demands for X, and there would be no cross-hauling and no distinction between gross and net trade. Note, however, that if there is domestic exchange in autarky (that is, unless the endowment point is on the contract curve) for prices close enough to the autarky price ratio the cross-hauling possibility of Figure 1 must exist.

In the case examined in Figure 1, the two consuming groups were assumed to be labourers and capitalists. A more general model would allow the two consuming groups to have endowments of both capital and labour. This substantially complicates the analysis, of course, for now there will be an

infinity of choices for each consuming group as to how they will allocate their capital and labour between the two industries, and for each there will be a different commodity endowment point. Thus rather than the single endowment point corresponding to the E of Figure 1 there will be a locus of possible endowments.[5] Several characteristics of this locus are known. First, since the reallocation of an individual consumer's labour or capital services from one industry to another cannot change his income or welfare, the endowment line must be parallel to the relevant price line. Second, if the K/L ratios for the two groups of consumers lie between the K/L ratios for the two industries, then one of the commodity endowment points will be the output bundle which would be produced by considering the two groups of consumers as separate production units, each producing their own endowment bundles.

This last point is most easily seen by the use of a technique introduced by Lancaster (1957). Figure 2 shows the standard factor-box diagram with point A the equilibrium production point. From 0_x and 0_y draw lines parallel to AO_y and O_xA respectively, forming the parallelogram O_xAO_yB. Now as long as the factor endowment point for the two groups lies in this parallelogram both groups could produce their own commodity endowments. Thus with factor endowment F we have for the first group the efficient production locus $O_xA'F$. Corresponding to O_xAO_y we have the PPC TAT' of Figure 2, and corresponding to $O_xA'F$ we have $WA'W'$. Note that $WA'W'$ is precisely the production possibility curve for nationals derived by Bhagwati and Brecher (1980) and used by Brecher and Bhagwati (1981), although the constructions differ somewhat.[6] The production set for consumer 2 could be constructed in the

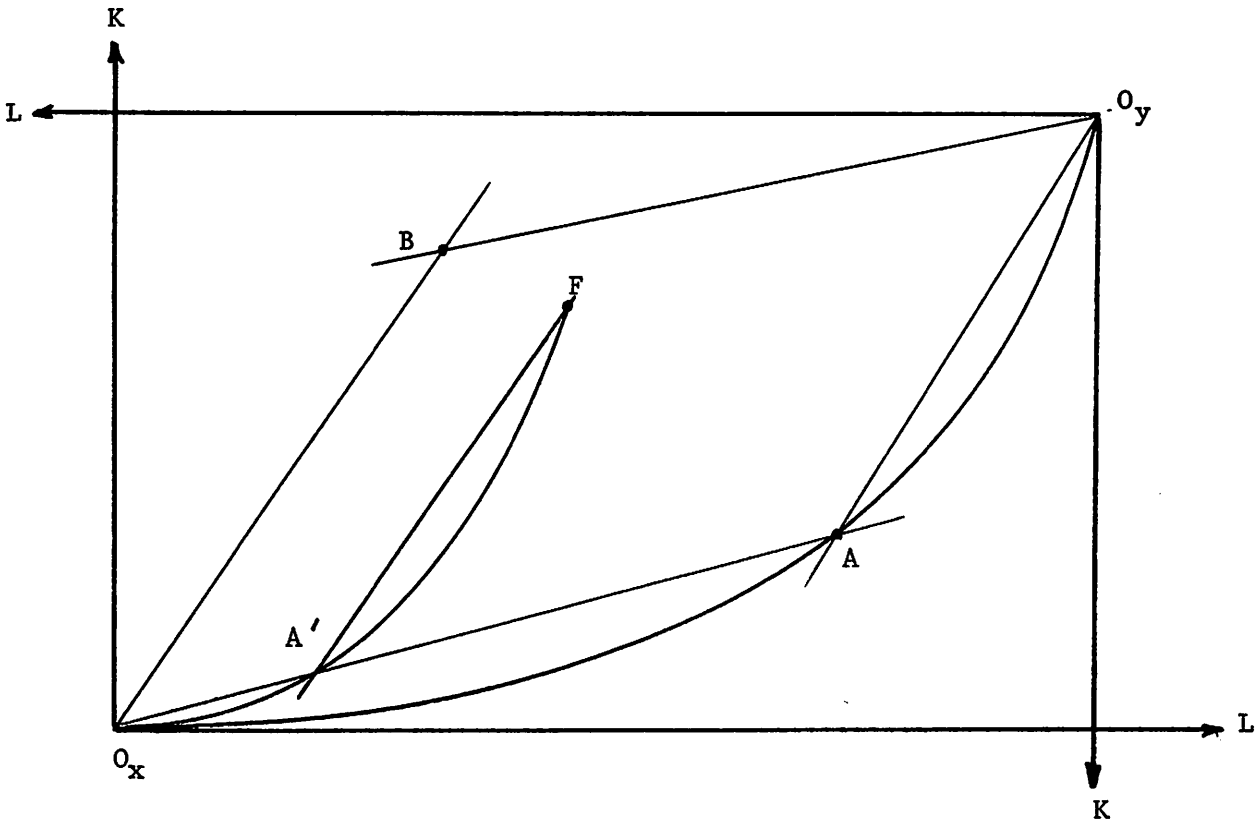

Figure 2

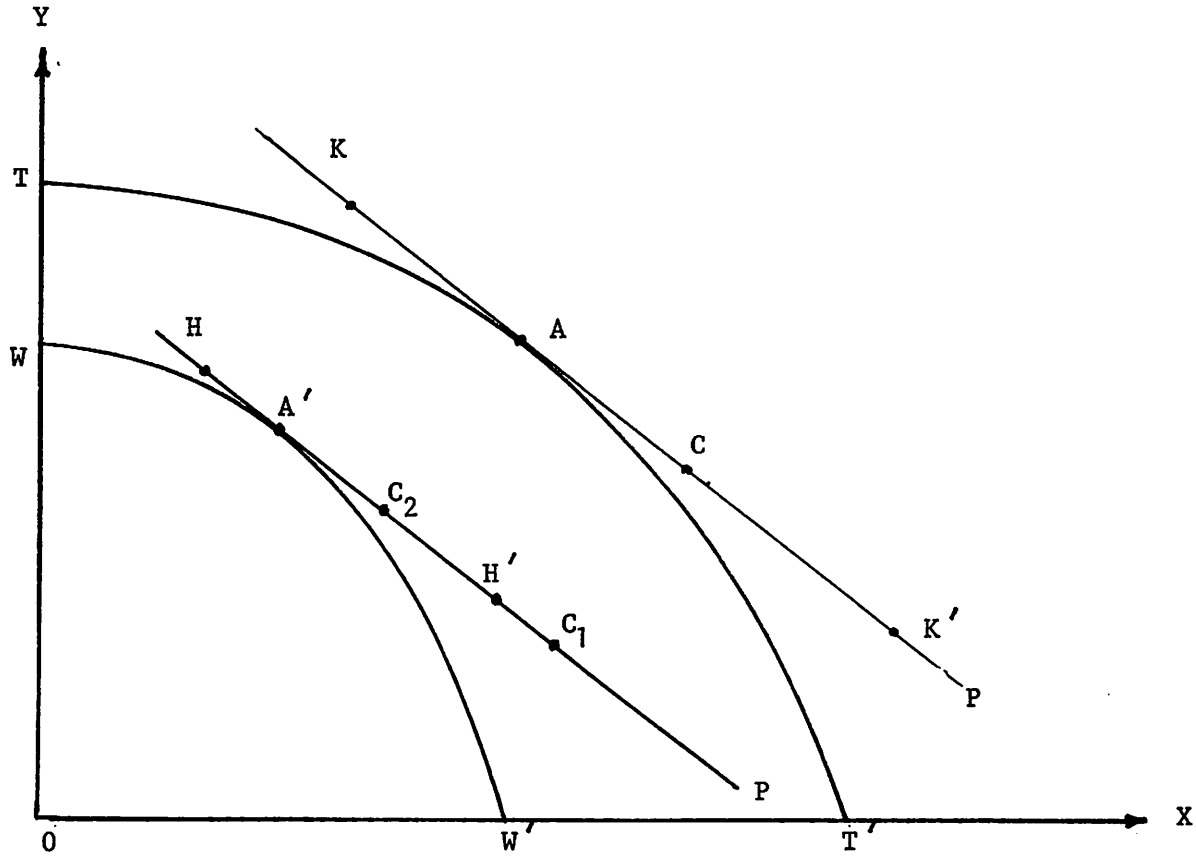

Figure 3

same way, or by taking the difference between $WA'W$ and TAT' for all pairs of corresponding points. Thus for the aggregate production point A, A' is the production point for 1 and AA' the production vector for individual 2. For A to be an equilibrium production point for the economy as a whole, the equilibrium price line P is tangent at A. Note that this same P is tangent to the production sets of both groups as well, as long as both consumers produce both commodities.

Point A' in Figure 3 is only one of an infinite number of possible output endowments associated with production at A for the economy. Output endowments are simply the payments to the two consumers as owners of factors of production in units of the two commodities produced, and these endowments thus depend on to which industry the consumers allocate the services of their labour and capital. Different allocations among industries cannot affect consumers' income or welfare, and thus all possible endowment points must lie on the price line P through A'. The actual production endowment locus can be derived, but is of no particular significance, so we simply assume that the line segment $HA'H'$ of price line P in Figure 3 represents all possible commodity endowments for the two consumers associated with production at point A. Points C_1 and C_2 again represent the equilibrium consumption points for consumers 1 and 2. Now it is clear that the utility of the two individuals is independent of where on HH' the endowment point actually lies, but equally clear that gross trade flows depend crucially on where this point is. Thus with endowments at H gross trade is the vector KK', equal to $HC_2 + HC_1$, while with endowments at H' gross (and net) trade is AC. We thus have:

<u>Proposition 2</u>: The volume of gross trade and whether there is cross-hauling will depend on how consumers allocate their factor services between industries.

This proposition obviously depends on the assumption of a barter system. Note, however, that even the introduction of a neutral money with which factors are paid and commodities purchased does not affect the indeterminacy of the gross trade vector. Indeed money introduces further possibilities in this frictionless world, for now <u>all</u> goods consumed by domestics could be purchased in the foreign country.

To this point we have considered cases where both preferences and factor endowments differ between consumers. We now concentrate on taste differences by assuming that the two consumers possess equal quantities of both factors. Thus in Figure 2 the endowment point would be in the centre of the factor box. This simplifies our analysis for now both individuals have the same output endowment frontier, and we can now draw the indifference curve map for both individuals from the origin. Note that A' will always be on the straight line $OA'A$. At the same time this assumption eliminates all the effects of factor endowment differences and guarantees that the results derived depend entirely on domestic taste differences.

Figure 4 illustrates the basic model, and the case shown with price line P corresponds to the autarky situation of the traditional model. With endowments for both individuals at A' domestic excess demands can be satisfied by purely domestic exchange, since $C_1A' = C_2A'$. Of course this need not be the pattern of exchange, for it may be more convenient for the two consumers to trade

with foreigners, resulting in a gross trade vector C_1C_2. Furthermore, the commodity endowment points for the two individuals need not be coincident at A', but could, for example, be at C_1 and C_2 such that both consumers produce their own requirements of both goods. The infinity of other possibilities could result in a wide variety of gross trading situations. From a theoretical point of view in this frictionless model these gross trading situations are not of much interest, for they clearly have no welfare implications. Later, when domestic transportation costs are introduced, the situation will be quite different. It is important to note, however, that a good deal of the trade which is observed in the world may have no welfare consequences. The gains from trade are gains from net trade. The trade observed in real world situations is gross trade.

One important result is obvious from Figure 4. With A the autarky position it is clear that any small price change will make one individual better off and the other worse off. Note that the fact that trade will make some individuals worse off is not associated with the Stolper-Samuelson result, for we have completely neutralized differences in factor rewards. Indeed this result can be thought of as the demand counterpart of the Stolper-Samuelson Theorem. More formally we can state:

<u>Proposition 3</u>: Quite apart from the effect through factor returns, if tastes differ trade will harm the individual with an excess demand for the export good.

It is important to note that trade is not always harmful to one individual. It is clear from Figure 4 that if prices change by enough, so that both C_2 and C_1 are on the same side of point A', then further price changes

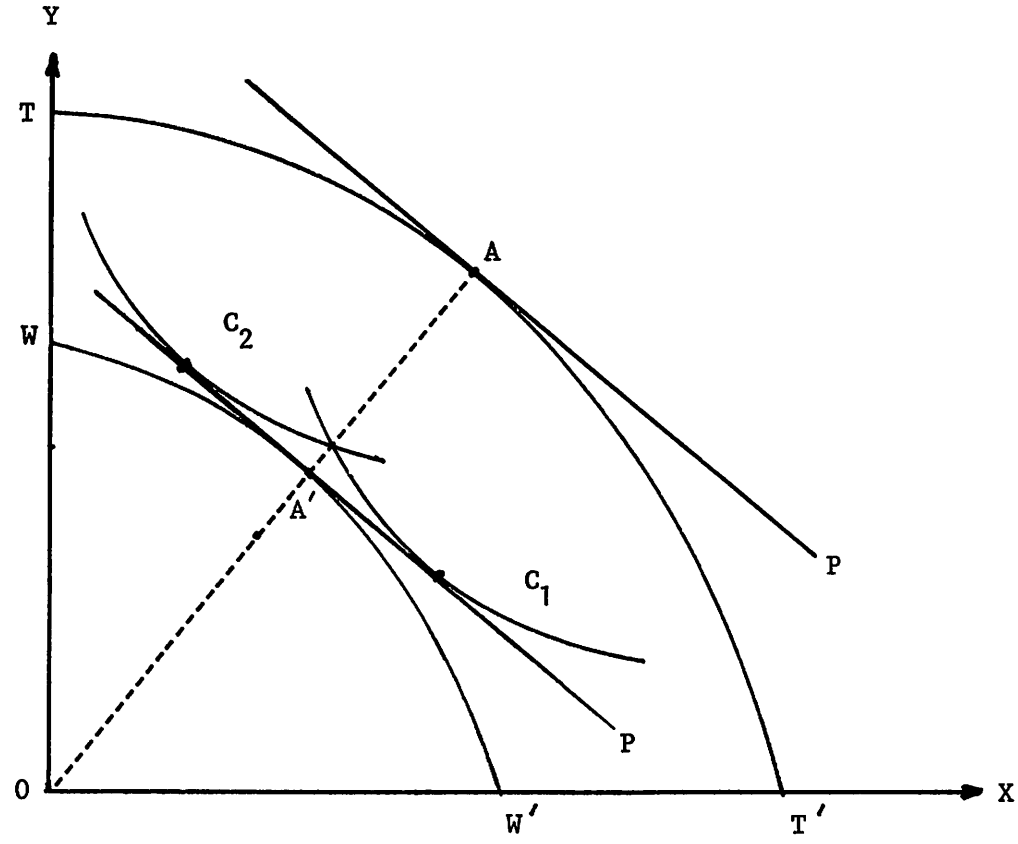

Figure 4

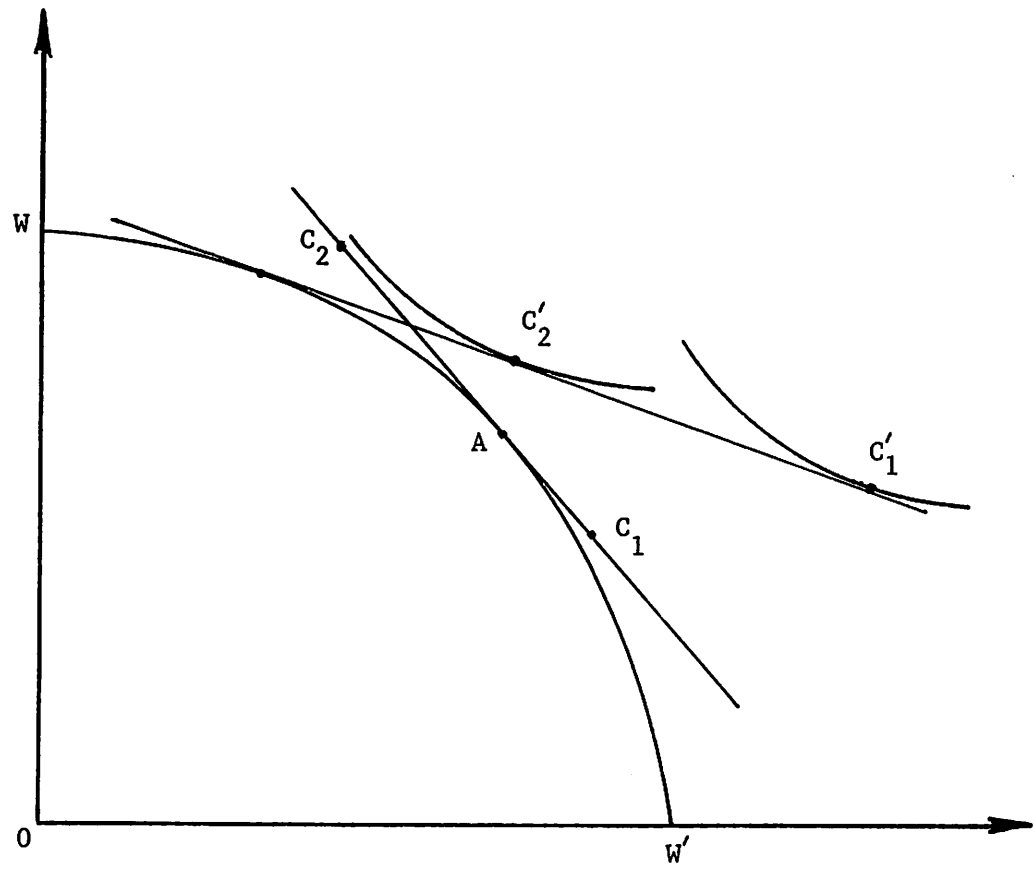

Figure 5

will change welfare for the two consumers in the same direction.[7] It is even possible that the consumer who originally loses could be better off than in autarky; such a situation is shown in Figure 5. This illustrates another difference from the Stolper-Samuelson result where changes in factor rewards are a monotonic function of commodity price changes. In the case described here small movements from autarky will always make one consumer worse off but large changes may make all individuals better off.

It is, of course, well known that gains from trade can be assured only with an appropriate redistribution of income; P. A. Samuelson (1939) made this quite clear in his original proof of the theorem. The impression is often left, however, that redistribution is required due to the Stolper-Samuelson results. Note also that, unlike the Stolper-Samuelson Theorem, the argument of Proposition 3 generalizes easily to any number of individuals. These remarks simply reinforce the well-known but often neglected proposition that no proposal for free trade is complete unless it includes a specific plan for income redistribution.

III. Tariffs, Quotas and Taxes

In the present model where cross-hauling occurs, the standard conclusions regarding tariffs, quotas and taxes must be revised. First, it is clear that since the two goods are both exported and imported, a tariff could be imposed on either or both commodities. Suppose that, in terms of Figure 6, both individuals carry out all of their trade in foreign commodity markets, so that the total trade vector is C_2C_1. First, assume that a tariff is levied on commodity Y. In a frictionless world the immediate effect of any small tariff will be an increase in domestic exchange. The importer of X will initially find that domestic production is less expensive than imports and will

purchase as much as possible in the domestic market. In Figure 6 consumer 2's demand for Y can easily be satisfied domestically. Here, a tariff reduces gross trade but does not change net trade, and welfare remains unchanged for both individuals. While it is dangerous to draw policy conclusions from such a simple model, the analysis suggests that the commodity on which the tariff is imposed may be quite important for small countries.

Now consider the more interesting case of a tariff on X. Again this will first of all result in a switch from foreign trade to domestic exchange, but in this case consumer 1's demand for X cannot be satisfied through exchange with consumer 2. The domestic price of X will thus increase and production will move to B on the tariff-ridden price line P'. Consumer 2 can now sell X at price P' and thus his welfare increases to C_2'. Trade between the domestics moves consumer 1 to D, and then trade with the rest of the world at price line P results in equilibrium for consumer 2 at C_2'. It is clear that the tariff has had a differential welfare effect on the two individuals, and we thus have a corollary to Proposition 3. Note also that had both individuals imported X in free trade, a tariff could first reduce and then increase the welfare of consumer 2.

Here and throughout, in order to avoid problems associated with changing the endowment point, we are assuming that all tariff or tax revenue is distributed, in lump-sum fashion, to the individual from whom it was collected. In Figure 6 the "extra" utility for consumer 2 associated with being above the domestic price line P' through B is due to the tariff revenue. Note that even with <u>all</u> the tariff revenue consumer 2 will always be worse off with a tariff.

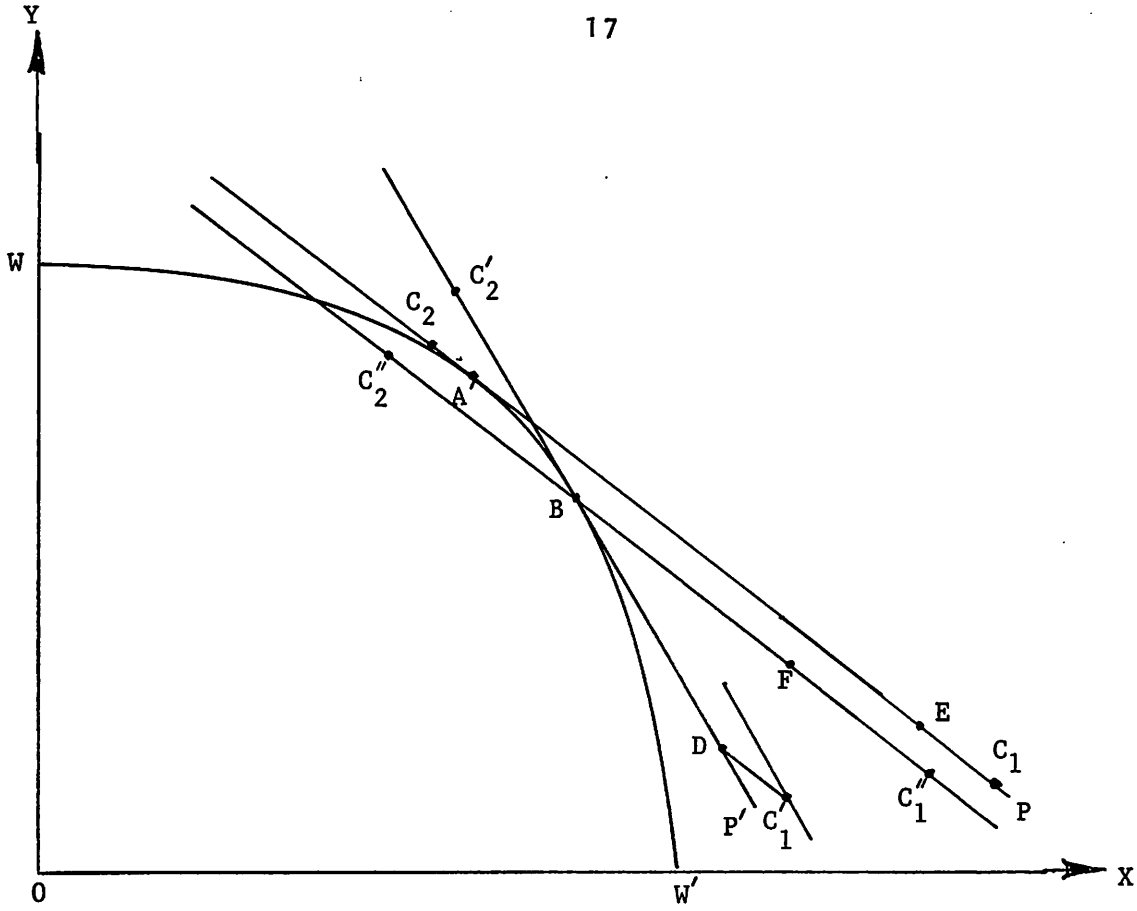

Figure 6

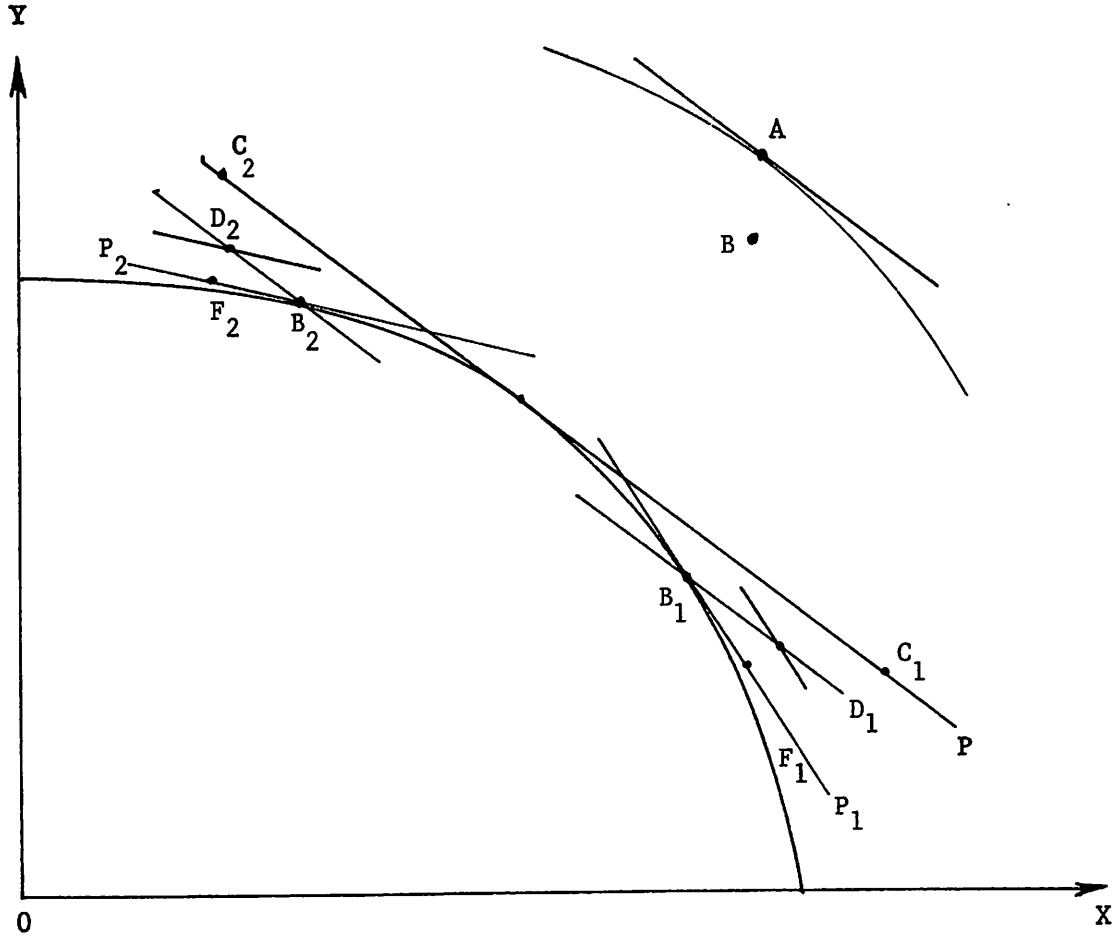

Figure 7

The implications of the imposition of quotas are also different in this model. In the situation in Figure 6 the initial effect of a quota imposed on either or both commodities would be simply to internalize trade, for if one individual finds that he cannot satisfy his excess demand in foreign markets, he will turn to the domestic market. In a frictionless model, and presuming that the quota is large enough to permit the satisfaction of net trade flows, the quota will have no welfare implications of any kind. In this model there are many possible equilibria, some with small amounts of trade and some with large amounts of trade, among which the individuals in the economy are indifferent, and the imposition of quotas simply limits the range of possibilities. If, on the other hand, quotas are small enough to prevent the net trade flow from being achieved, the price of the commodity against which the quota has been imposed will increase. Thus, if an unrestrictive quota is imposed and this quota is gradually reduced, the effect could be first to switch trade from international to domestic markets until domestic exchange has been maximized, and thereafter for quotas to have the same effects as tariffs. From the above we have:

Proposition 4: Tariffs and quotas may substantially reduce the volume of trade without having any welfare consequences.

R. A. Mundell (1960) has argued that a tariff structure can be duplicated by a system of purely domestic taxes. In the present model this is not, in general, true. Consider the free trade position in Figure 6 with net trade of $A'E$ and gross trade of C_2C_1. Assume a production subsidy to X and a consumption tax on X at the same *ad valorem* rate as the tariff in the previous example. The production subsidy to X will move production to B just as in the tariff case. The consumption tax, unlike the tariff, will increase

the price of X for both individuals, but will not permit individual 2 to sell his excess supply of X at the tax-ridden price. Both individuals will still be able to trade with each other or with foreigners at the terms of trade P, and the equilibrium consumption points could be C_2'' and C_1''.

Several differences between a tariff and an equal-rate tax-subsidy are clear from Figure 6. First, it is easily shown that a tariff will always reduce net trade by less than a tax-subsidy program.[8] Second, the welfare effects are quite different, for with a tax-subsidy program both consumers lose, while with a tariff, consumer 2 is better off and consumer 1 worse off. If appropriate redistributions are carried out when tariffs are imposed this distinction has no great significance; otherwise a tax much more equitably shares the welfare burden than does a tariff.[9] Finally, while a tariff will reduce trade to the essential net-trade component, a tax-subsidy system need not. In Figure 6, for example, both consumers still trade with foreigners after the imposition of the taxes. We thus have:

<u>Proposition 5</u>: The effects of a tariff and an equal-rate tax-subsidy will not be identical when domestic consumers have qualitatively different excess demands in free trade.[10] Net trade will be reduced less with a tariff, and the welfare consequences for domestics will differ.

This conclusion may seem somewhat paradoxical for it suggests that taxes, a domestic policy tool, may be more appropriate in the international sector than a tariff. The reason for this result stems from the differences in the way in which taxes and tariffs affect the two different consumers in the domestic economy. With a tariff one of the consumers is, in effect, forced to trade at two different price ratios, while with a tax this does not occur.

To put the matter slightly differently, with a tax the government collects the same per unit tax regardless of from whom the commodity is purchased, and thus, including the assumed redistribution of income, both individuals actually trade at the ratio C_2C_1 in Figure 6. With a tariff the government collects revenue on goods purchased abroad but not on domestic exchange, which allows one of the domestic consumers to gain by trading at the tariff distorted domestic prices. In effect this consumer collects the "tax" rather than the government. Thus the choice between taxes and tariffs is a choice of where we impose the distortions--between domestic consumers or between domestics and foreigners. The argument thus bears a similarity to the branch of customs union literature which compares the relative number of distortions created between the various trading partners.[11] The theory of tariffs has failed to take account of these purely domestic effects of tariff imposition associated with the demand side of the model.

IV. Domestic Transportation Costs

We now relax the rather restrictive assumption of no frictions and assume instead that the two consumers are separated spatially and that significant transportation costs exist between these two locations. Further, assume that no transportation costs exist between domestics and the foreign markets.[12] In this case gross trade will be at a maximum, for no domestic exchange will occur. It is initially assumed that the two consumers trade in opposite directions, giving the situation of Figure 7, with a trade vector C_2C_1.

We now consider the imposition of a tariff, and note first that because both goods are imported, a tariff can be applied on either or both commodities.

We first consider the case of a uniform tariff on both commodities at a rate which is initially less than the transportation cost for both goods between the two consuming groups. Such a tariff structure is effectively a tariff on X for consumer 1 and a tariff on Y for consumer 2, and the production and consumption changes will be the usual ones, and in Figure 7 moves production to B_1 and B_2 and consumption to D_1 and D_2 for consumers 1 and 2, respectively. It is again assumed that the tariff revenue is returned to the consumer from whom it was collected as a non-distorting, lump sum subsidy, thus avoiding endowment changes. The price lines facing the two consumers (both in their role as producers and consumers) are P_1 and P_2. Because both still trade with the rest of the world at terms of trade P both can consume above their producer price lines through B_1 and B_2.

There are several important implications of this tariff structure. First, because the tariff has moved production in opposite directions for the two consumers, the sum of the production points B_1 and B_2 no longer gives a point on the production possibilities curve for the economy as a whole. Instead total production would be a point such as B. Furthermore, this will be true whether a tariff is levied on both goods or on only one of the two. Thus we have:

<u>Proposition 6</u>: If consumers with different tastes are separated spatially a tariff will result in a dead-weight production loss.[13]

It is also clear from Figure 7 and from the Stolper-Samuelson Theorem that the tariff, by generating different production prices for the two consumers, results in different relative and real factor rewards for the two consumers. This has no particular significance in this model since we are

assuming that both individuals are identically endowed with labour and capital. Both individuals are already worse off from a consumption point of view, however.

Now suppose that the tariffs are increased so that they are just equal to the transportation costs. To simplify the diagram assume this equality occurred at the tariff-ridden prices P_1 and P_2 of Figure 7. For any small reduction in transportation costs consumers now find it profitable to internalize trade rather than to trade with foreigners. To the extent that this occurs the gains from foreign trade are lost, and if both consumers are able to satisfy their excess demands domestically, both will consume at points such as F_1 and F_2 on price lines P_1 and P_2. If domestic trade just balances there is no longer any tariff revenue. The effect of the tariff has been to internalize trade and substitute domestic tariff revenue for domestic transportation--transportation which uses resources but does not provide any utility to consumers.

Note that there are two separate sources of loss here. The first is due to the fact that the consumers are trading with one another at distorted prices rather than trading at world prices P. This is the loss associated with moving from D_1 to F_1 and from D_2 to F_2 in Figure 7. The second loss, associated with the use of resources to provide the required transportation, is not shown in the diagram. This would involve an inward shift of the production sets for both individuals.

<u>Propositon 7</u>: Tariffs which internalize trade in the presence of transportation costs result in welfare reductions both from the loss of tariff revenue and from the wasteful use of resources to provide transportation.

In general one would not expect trade between regions to balance, and thus in Figure 7 one individual or the other would be expected to trade with the rest of the world even after trade has been internalized. Thus some gains from foreign trade would still remain. Of course for a high enough tariff all foreign trade could be eliminated. The assumption that both regions initially face the same world prices is also not crucial to the analysis and can thus be relaxed.

Certain countries, of which Canada is an obvious example, have pursued a policy of high tariffs as a method of ensuring domestic markets for domestic production. In the Canadian case tariffs have been imposed on manufacturers to protect Eastern industry, or in other words, to force Western consumers to buy Eastern output. It is not clear, however, that the true costs of such protection have been appreciated. Any tariff which is successful in accomplishing this goal imposes on consumers not only the traditional cost associated with the distortion but also the costs identified in Propositions 6 and 7. For countries such as Canada it may well be that the major cost of a tariff is the waste of resources associated with unnecessary transportation and inefficient production. Paradoxically, the major cost of the tariff is due to the fact that it results in domestic trade.

V. Conclusions

The purpose of this paper has been to investigate the implications of taste differences among consumers within a country for several of the traditional trade propositions. To permit such an investigation, a model was developed which allowed tastes to differ among groups but where,

nevertheless, well-defined equilibria were possible which were unique with respect to net trade. It was found that in the frictionless world of traditional trade theory the net trade bundle could be achieved through an infinity of different gross trade configurations, many of which involved importing and exporting both goods. With tastes differing among domestic consumers it was also shown that terms of trade changes could have differential welfare effects on the two consuming groups, so that all individuals need not gain from trade; this in spite of the fact that all consumers had identical endowments of factors.

The traditional results concerning tariffs, quotas and taxes were also found to require revision when domestic tastes differed. It was shown that tariffs and quotas could reduce trade without reducing welfare, and that in general, tax-subsidy systems were not equivalent to equal ad valorem rate tariffs. Indeed both the volume of trade and the welfare consequences were found to differ.

With the different consuming groups spatially separated, tariffs were found to create distortions that have not previously been recognized. First, a tariff which affects regions differently will result in a deadweight production loss and move the economy inside the production possibility curve. Furthermore, if these tariffs result in the internalization of trade, the gains from trade with the rest of the world are lost and welfare is further reduced. There is, as well, a welfare loss associated with the use of resources to provide transportation between regions--transportation that would not be required with free trade.

Footnotes

*I would like to thank Murray Kemp, Doug Purvis, and Richard Snape for helpful comments.

[1]For a full discussion see John S. Chipman (1963).

[2]One area of the neoclassical analysis which has paid more attention to demand conditions is growth theory, where differences between the saving propensities of capitalists and labourers are found to result in important changes in some of the conclusions.

[3]In general, an offer curve so derived need not be well behaved (see Johnson (1959)), and the trade equilibrium need not be unique.

[4]Consider the specific example where $X = K^{1/4}L^{3/4}$ and $Y = K^{2/3}L^{1/3}$. It is easily shown that for any aggregate output point $X_0 Y_0$ on TAT', labourers will receive $\frac{3}{4}X_0$ and $\frac{1}{3}Y_0$ while capitalists will receive $\frac{1}{4}X_0$ and $\frac{2}{3}Y_0$.

[5]This locus can be constructed but adds little to the analysis.

[6]As will be clear from Figure 2, the entire curve $WA'W'$ cannot be derived in the manner indicated. As more Y is produced moving A closer to 0_x, a point will be reached where the first group cannot produce both commodities (A' becomes coincident with 0_x before A does). The derivation of the remaining portion of the curve has been described by Bhagwati and Brecher (1980) and need not be repeated here.

[7]Note that Proposition 3 will still apply for neither consumer has excess demand for the export good.

[8]Put point F on the price line P through B such that $C_2''B = BF$. Then FC'' is net trade with the tax-subsidy system, and DC_2' is net trade with a tariff. Since C_2' and C_2'' lie on the same line from the origin, and since a line through DF is parallel to the line from the origin through C_2'' and C_2', $FC_2'' > DC_2'$.

[9]Note that this conclusion is true even though in the tariff case all the revenue was returned to the individual whose welfare was reduced, while in the tax case the individuals share in the tax proceeds, each receiving what he paid.

[10]If in free trade both individuals have excess demand for the same commodity, then the standard result that tariffs and tax-subsidies are identical will be true, at least for small tariffs. At some level, however, a tariff will eliminate trade for one individual, and higher tariffs will have the effect shown in Figure 6. Thus as long as tastes differ, there is <u>some</u> tariff for which the standard result does not hold.

[11]For example, see R. Lipsey (1960).

[12]The polar case has been assumed here, but clearly all that is required is that domestic transportation costs are higher than international transportation costs.

[13]As in previous cases, if both consumers initially trade in the same direction a small tariff will not have this result. A large enough tariff, however, will eliminate trade for one consumer before doing so for the other, and thus production inefficiency will occur. In what follows it is assumed that the two consumers initially trade in opposite directions.

References

Bhagwati, Jagdish N. and Brecher, Richard A., "National Welfare in an Open Economy in the Presence of Foreign-Owned Factors of Production," Journal of International Economics 10 (February 1980): 103-115.

Brecher, Richard A. and Bhagwati, Jagdish N., "Foreign Ownership and the Theory of Trade and Welfare," Journal of Political Economy 89 (June 1981): 497-511.

Chipman, J. S., "A Survey of the Theory of International Trade: Part 3, The Modern Theory," Econometrica 34, January 1966: 685-760.

Johnson, H. G., "International Trade, Income Distribution and the Offer Curve," Manchester School 27, 1959: 241-260.

Kenen, P. B., "Distribution, Demand, and Equilibrium in International Trade: A Diagrammatic Analysis," Kyklos, 1959: 629-638.

Kenen, P. B., "On the Geometry of Welfare Economics," Quarterly Journal of Economics 71, 1957: 426-47.

Lipsey, R. G., "The Theory of Customs Unions: A General Survey," Economic Journal 70, September 1960: 496-513.

Mundell, R. A., "The Pure Theory of International Trade," American Economic Review 50, March 1960: 67-110.

Rao, V. S., "Tariffs, and Welfare of Factor Owners: A Normative Extension of the Stolper-Samuelson Theorem," Journal of International Economics 1, November 1971: 401-415.

Samuelson, P. A., "The Gains from International Trade," Canadian Journal of Economics and Political Science V, 1939: 195-205.

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