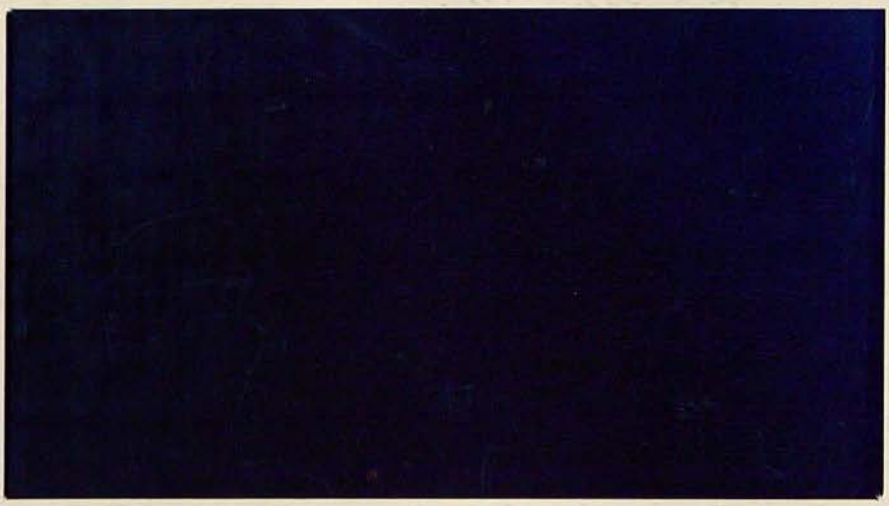
UCD Department of Agricultural Economics



WORKING PAPER SERIES

University of California, Davis
Department of Agricultural Economics

WELFARE IMPLICATIONS OF A PREFERENTIAL TARIFF REDUCTION FOR AGRICULTURAL EXPORTS FROM LESS DEVELOPED COUNTRIES VS. A GENERALIZED TARIFF REDUCTION

by Giovanni Anania

Working Paper No. 88-11

Welfare Implications of a Preferential Tariff Reduction for Agricultural Exports from Less Developed Countries vs. a Generalized Tariff Reduction

Introduction

The debate developed in recent years about the impact of developed countries' agricultural trade policies on less developed countries' economies has not yet converged to widely accepted results. In general, two divergent approaches seem to be prevailing. According to one, the existence of trade barriers is definitely harmful for less developed countries' economies, and a generalized reduction of the level of protection of developed countries' agricultures is suggested as a powerful tool capable of stimulating less developed countries' exports. Supporters of this approach in developed countries are, in large part, traditional exporters of agricultural products. The United States' position in the United Nations Conference on Trade and Development (reluctant to the implementation of a preferential import tariff reduction for less developed countries' exports), and in the General Agreement on Tariffs and Trade meetings (in support of an extension of the Most Favored Nation principle to a much larger set of agricultural commodities) may be seen as representative of this first approach. The same position has been recently very firmly taken by the World Bank (1986).

A second alternative view does not see protectionist agricultural policies as necessarily harmful for less developed countries, and rejects the idea of a generalized reduction of barriers to trade as an effective means for supporting the economic development of less developed countries. According to this second approach, a preferential tariff reduction that increases the market access for less developed countries' exports, without reducing the nominal level of the barriers faced by other developed countries' exports, is suggested as an effective instrument

to help less developed countries' economies. Among developed countries, this approach has in general been embraced by the traditional importers of agricultural commodities. The European Community is probably the most representative supporter of this point of view. Its approach, both in the United Nations Conference on Trade and Development and in the General Agreement on Tariffs and Trade rounds, has been opposite to that of the United States. The European Community has shown a relative openness (with an eye, of course, to the interests of its domestic producers) to the Generalized System of Preferences principle, and a strong resistance to a GATT round focusing on the barriers to agricultural trade.

In both cases it seems clear that developed countries tend to argue that the trade policy scenarios which are optimal for less developed countries are those that they perceive as desirable for themselves.

This paper focuses on a comparative evaluation, on theoretical grounds, of the welfare impact of a preferential tariff reduction for agricultural exports from less developed countries versus a generalized tariff reduction.

From a methodological point of view, the main original feature of the paper is that in the model used for the analysis countries' positions on the world market are not set "a priori". Instead, countries are allowed to switch from one side of the market to the other as the price changes.

It will be shown that an importing developed country, willing to help less developed countries' growth, is <u>always</u> better off by doing so through a preferential tariff reduction than under a generalized tariff reduction. On the other hand, an exporting developed country is <u>always</u> better off if the importing developed country uniformly lowers its tariffs rather than if a preferential tariff reduction takes place. The results for the beneficiary country depend, at least in part, on the assumptions about its welfare function. Under relatively weak postulates, the beneficiary country will definitely opt for a preferential tariff reduction rather than a generalized tariff reduction.

In addition, some other interesting results are discussed, such as the possible existence of multiple feasible equilibrium solutions, and the case of an exporter made better off by the imposition of a tariff by an importer.

In the next section, the basic characteristics of the model are presented. Three alternative trade policies, the imposition of a non-discriminatory tariff, a preferential tariff reduction and a generalized tariff reduction, are then comparatively analyzed. A classical definition of the welfare functions, mainly based on the concept of producers' and consumers' surplus, is used. In the second part of the paper, a more complex definition of the welfare functions is introduced. It involves producers' and consumers' surplus, foreign exchange earnings and domestic income. The new welfare functions are used to re-evaluate the impact of the three alternative policy scenarios outlined above. The last section synthetically recalls the main results.

The basic model

The analysis is based on a one-commodity, three-large-countries world model. All the results are derived in a partial equilibrium framework. The "ceteris paribus" condition is here assumed in its stricter definition. Changes in the sector which is analyzed do not affect either prices or quantities of inputs and outputs in other sectors of the economy. The only inter-sectors linkages which are taken into account are those due to retaliations to trade policy changes. Fixed exchange rates, zero transportation costs, linear demand and supply curves and perfect competition on both the domestic and the world markets are assumed.

Throughout the paper, country A is the country whose effects of alternative trade policy choices on the market equilibrium are to be evaluated. These policy options are: (i) the imposition of a non discriminatory import tariff (NDT), (ii) granting free access to the imports from a preferred country, leaving a (discriminatory) tariff (DT) on the imports from a third, non preferred, country,

and (iii) a complete trade liberalization (FT). Country C will be granted preferential treatment, while country B will be the non-preferred country.

In making its trade policy choice, country A is assumed to be maximizing a welfare function (W_a) whose arguments are its "market specific social welfare" ($MSSW_a$), defined as the sum of producers' and consumers' surplus (CPS) and of the tariff revenue (TR) (assumed to be redistributed to producers and consumers as a lump sum transfer), and countries B (W_b) and C's (W_c) welfares, which are defined as the sum of their producers' and consumers' surplus:

$$W_a = W_a(\, MSSW_a,\, W_b\, ,\, W_c\,) \quad ; \qquad (1)$$

$$W_b = CPS_b \quad ; \qquad (2)$$

$$W_c = CPS_c \quad . \qquad (3)$$

A donor country social welfare function similar to (1) has been proposed, in a framework close to the one considered here, by McCulloch and Pinera (1977). The arguments of the welfare function they define, however, do not contain the non-preferred country's welfare; by doing so they leave unjustifiable a donor country policy which prefers the exports from the beneficiary country without imposing on the non preferred country's exports a prohibitive tariff.

Furthermore, it is assumed that country A's behavior is always such that its welfare function is maximized, and that in doing so country A is implicitly taking into account the effects of policy reactions by countries B and C to its own policy (only countries negatively affected by country A's policy changes are supposed to react). The impact on country A's welfare of these reactions is supposed to have been made endogenous into W_a as part of the W_b and W_c effects. In addition, the presence of W_c as one of the arguments of country A's welfare function reflects non-economical values that country A attaches to country C's welfare.

Country A's welfare will monotonically increase as its market specific social welfare increases. In addition, country A's welfare is positively related with

country C's welfare because of a concern of country A for country C's economic growth, (while country A is indifferent to country B's welfare increases). The same welfare decreases (due to retaliation in other markets, for example) when country B's and/or C's welfare decreases because of country A's policies. These assumptions about country A's welfare function may be described as follows:

$$\partial W_a/\partial MSSW_a > 0;\ \partial W_a/\partial W_c > 0;\ \partial W_a/\partial W_b^{+} = 0;\ \partial W_a/\partial W_b^{-} > 0\ . \qquad (4)$$

The impact of country A's alternative trade policies on countries B and C is evaluated through the changes in those countries' sum of consumers' and producers' surplus associated with the market under scrutiny.

An evaluation of the policies' impact on the world as a whole cannot be realized because of the assumptions made about country A's welfare function (specifically, because of the non-economical values country A attaches to country C's welfare), needed to make country A's trade preference policy choice consistent with a welfare optimizing behavior.

Blackhurst (1972) used the sum of consumers' and producers' welfare and of the tariff revenue to evaluate the comparative impact on the world's welfare of a preferential versus a generalized tariff reduction. However, a preferential trade policy is not consistent with a donor country's behavior maximizing a welfare function whose arguments are producers' and consumers' surpluses plus tariff revenue only. The consequence is that one of the following two options must hold: (a) if the policy choices he considers are rationally justified, then a world's welfare function defined as the sum of producers' and consumers' surplus plus the tariff revenue does not equal the sum of each country's individual welfare, or (b) if the world's welfare is given by the sum of the individual countries' welfares, then the donor country's preferential trade policy remains unjustifiable, because it reduces the sum of domestic producers' and consumers' surplus and of the tariff revenue.

To simplify the analysis, no trade policy intervention is assumed to be implemented by countries B and C in the market considered. The only exception, as discussed below, will be the imposition by country C, whenever this is necessary, of a prohibitive tariff to make any arbitraging unprofitable.

In the basic scenario, country A is maximizing its welfare function by imposing a non-discriminatory per unit import tariff. Given this "reference" policy scenario, two policy changes are discussed: country A eliminating the tariff, and country A eliminating the tariff on its imports from country C, leaving the tariff level unchanged on its imports from country B. These policy changes are treated as determined exogenously, and may be thought of as induced by two different modifications of the parameters of country A's welfare function.

Country A is assumed to grant the preferential treatment to country C under the condition that it does not arbitrage; i.e. country C is not allowed to act at the same time on both sides of the market. Whenever it is necessary, country C imposes a prohibitive tariff either on its imports from country B or on its exports to country A.

To introduce the basic tools used throughout the analysis, the market equilibrium in the no-intervention case (under the hypothesis that country C is a net importer) is depicted in figure 1. Countries A, B and C domestic markets are represented in parts a, b, and c, respectively. The world market is given in the part labeled as wm , which actually contains all the information needed to determine the market equilibrium. Domestic and world prices are all expressed in the same unit, which, given our fixed exchange rates assumption, may either be any of the three domestic currencies or a linear combination of them.

The world excess demand is obtained by summing horizontally the excess demand functions of the three countries. In figure 1.wm it is represented by the line AA'A"A"'. At prices higher than A no country is willing to import. At

prices between A and W the only country willing to import is country A. Between these prices, the world excess demand coincides with country A's excess demand (AB). When the price falls below W, country C joins country A in its willingness to import. At any price between W and C, the world excess demand is given by the sum of these two countries' excess demands. Eventually, at prices below C, the world excess demand represents the willingness to import of all the three countries. The world excess supply is obtained analogously, and is given by the line CL'L''L'''.

Generally, when excess demand and supply functions are used, each country is considered as acting only on one side of the world market, either as an exporting country or as an importing one, regardless of the price level. No switching is allowed from one side of the market to the other as the price changes. However, any country will be willing to move from the importers' side to the exporters' one for a sufficiently high increase of the world equilibrium price. A switch in the opposite direction will always be possible for a sufficiently large decrease of the world price. At a world price level equal to W, for example, country C is perfectly self-sufficient. At any price greater than W it will become a net exporter. At prices below W it will be a net importer.

In both theoretical and empirical research analyzing trade policy changes, the no switch hypothesis induces relevant distortions whenever (a) in the reference scenario one or more countries have a degree of self-sufficiency close to unity, and/or (b) a far from marginal change in the world market equilibrium price is considered.

In figure 1 the free trade world equilibrium is given by the intersection of the world excess demand and supply functions. The equilibrium price is P, which equals the domestic price in each of the three countries. The volume traded is T (which is equal to ${}_dQ_b$ ${}_sQ_b$ in figure 1.b). Country B is the only exporter. It

exports I_a (which is equal to ${}_sQ_a\ {}_dQ_a$ in figure 1.a) to country A, and I_aT (which is equal to ${}_sQ_c\ {}_dQ_c$ in figure 1.c) to country C. Country A produces ${}_sQ_a$ and consumes ${}_dQ_a$. Country B produces ${}_sQ_b$ and consumes ${}_dQ_b$. Country C produces ${}_sQ_c$ and consumes ${}_dQ_c$.

Country A's producers' plus consumers' surplus is given by area GILJ in figure 1.a, where GIF is the consumers' welfare and JLF is the producers' welfare. Area HIL is the net gain in terms of consumers' plus producers' welfare accrued by country A through international trading. This area is equal, by construction, to the area of the triangle APK in figure 1.wm .

Country B's welfare is given by area NOSR in figure 1.b, and its net gains from trade by the area OSQ, which is equal to the area CEP in figure 1.wm. Country C's welfare is equal to the area ZUVX in figure 1.c, and its net gains from trade to the area UVT, which is, by construction, equal to the area A'EK in figure 1.wm .

The analysis

Regardless of its policy choice, country A is supposed to be a net importer. Country B is assumed to be a net exporter. Four different cases, covering all possible positions on the market of country C, the beneficiary country, are considered: country C (a) being an importer whatever policy country A implements; (b) being an exporter whatever policy country A implements; (c) being an importer if A imposes a non-discriminatory tariff and in the free trade scenario, but being able either to move to the exporters' side or to act as an importer when A imposes a discriminatory tariff; (d) being an importer when A imposes a non-discriminatory tariff, an exporter if free trading occurs, and to be able to act either as an exporter or as an importer if A imposes a discriminatory tariff.

The welfare results for all these four cases are synthesized in Table 1. Three cases ("b", "c" and "d" above) are discussed in detail. The reader should not have any problem in verifying the results for the remaining one.

(b) country C as an exporter;

The reference scenario (Fig. 2) is characterized by country A imposing a non-discriminatory per unit tariff on its imports. This tariff is supposed to be optimal with respect to its welfare function. Our graphic analysis expands on the work by Johnson (1957 and 1958). The main difference between this paper's treatment and Johnson's (as well as Blackhurst's, which makes use of Johnson's graphic representation) is that in Johnson's model no switching from one side of the market to the other is allowed as the equilibrium price changes. As a result, the excess demand function is misspecified, leading to the identification of incorrect market equilibria.

In figure 2 the world excess supply and demand are expressed as functions of country A's equilibrium price. The no tariff excess supply is given by D'E'F'. The portion D'E' coincides with the lowest part of country B's excess supply. At equilibrium prices greater than OS' country C is willing to become an exporter as well. This determines the change in the slope of the world excess supply at E'. The tariff imposed by country A is equal to DD', and is introduced in the market representation through a parallel upward shift of the D'E'F' curve to the DEF one. The no tariff excess demand curve is given by AB'C'. When the non-discriminatory tariff is considered, the excess demand needs to be modified as well, to take into account the fact that country B's exports to country C do not face any tariff. Now ABC is the relevant excess demand function.

The market equilibrium results in a volume of trade equal to T. Countries B and C export price is equal to $P_{b,c}$, which is equal to P_a , the price in country A, minus the tariff. The tariff revenue collected by country A and redistributed to its consumers and producers as a lump sum transfer is given by the area $P_aP_{b,c}IG$.

If country A eliminates the tariff, the world excess demand is given by AB'C' , while the world excess supply is represented by D'E'F' . At equilibrium, the volume of trade equals T' and the world price (which coincides with the domestic prices in the three countries) equals P'. Country A imports from country B are equal to E_b', those from country C to E_b'T'.

The impact of the trade liberalization on countries B and C's welfare is positive. Country B's welfare expands by P'H'L$P_{b,c}$, country C's by H'G'IL. In both countries consumers' welfare decreases by a lesser amount than producers' welfare expands.

The sign of the impact on the MSSW in the trade liberalizing country is ambiguous, and depends on the tariff level in the initial scenario. Country A's consumers' and producers' surplus expands by the area P_aGG'P', but no tariff revenue is now collected. As a result, the net MSSW impact is given by the difference between the areas GG'M and P'M$IP_{b,c}$.

Consider the policy option by country A to impose a discriminatory tariff on its imports from country B only, granting tariff free access to country C's exports (Fig. 3). Moving from a non-discriminatory tariff to a discriminatory one (assuming the amount of the tariff remains unchanged) only affects the representation of the excess supply curve. This is now given by DE"F". The change is needed to make exports from country C not subject to country A's tariff.

The equilibrium price in countries A and C is now equal to $P"_{a,c}$. Country B's price is $P"_b$ ($P"_{a,c}$ minus the tariff). Country A's imports equal T". Country B's exports equal E_b", country C's E_b"T".

Country C is definitely better off with respect to both the free trade and the non-discriminatory tariff cases. Free trading is preferred to the non-discriminatory tariff. Essentially, country C is capitalizing on the competitive advantage over

country B's exports created by country A's preferential policy. In the non-discriminatory tariff case, country C's gains from trade equal area E"UR (which is equal to area EHG). They increase by area URNM in the free trade scenario. Under the discriminatory tariff, country C's welfare increases by an additional amount equal to the area MNG"H". Its consumers are worse off with respect to the other two scenarios, but their losses are offset by producers' gains. In order to neglect the possibility of any arbitrage, country C must impose a tariff on its imports from country B. This tariff must be greater than country A's discriminatory tariff.

Under the discriminatory tariff country B experiences the worst welfare impact. Its ranking of the trade scenarios is: (1) free trade (its gains from trade being equal to the area D'H'P'), (2) non-discriminatory tariff ($D'LP_{b,c}$), (3) discriminatory tariff ($D'VP_b"$). The same ranking is true for its producers, while consumers' ranking is: discriminatory tariff, non-discriminatory tariff, and free trade.

The overall impact in terms of producers' and consumers' surplus plus tariff revenue of the implementation of the trade preference policy on country A itself is ambiguous. It is given by the difference between the sum of the areas $P_aSH"P"_{a,c}$ and GG"S', and area H"S'IV'.

(c) country C as an importer in the non-discriminatory tariff and in the free trade cases, but being able either to move to the exporters' side or to act as an importer when A imposes a discriminatory tariff;

This case is represented in figure 4. Under the non-discriminatory tariff the excess demand curve is given by ABC, the excess supply by DEF. The equilibrium is reached at a country A price equal to P_a. The price in countries B and C is $P_{b,c}$. The volume traded is equal to T. Country A imports I_a, country C imports I_aT. Country B is the only exporter.

If country A decides to eliminate its protectionist tariff, the relevant excess supply and demand functions are D'E'F' and AB'C', respectively. The new equilibrium price, which coincides with the domestic prices in all the three countries, is P'. The volume of trade is T'. Both countries A and C import (respectively I_a' and I_a'T') while country B is the only exporter.

The elimination of the tariff makes country C definitely worse off. Its welfare decreases by the area G'H'LI. Country B, on the contrary, is better off by the area $P'G'M'P_{b,c}$. The sign of the change of country A's MSSW cannot in general be predicted; this change is given by the difference between areas HRH' and $P'RSP_{b,c}$.

An interesting result is obtained when the trade preference policy option is considered. In this case country C is able to choose between two distinct feasible market equilibria in which it appears on different sides of the market. The crucial point in this mechanism is the assumption that country C cannot <u>at the same time</u> export to country A and import from country B, thereby "cheating" on the trade preference granted by country A. Country C chooses between the two alternative feasible market equilibria, one in which it acts as an exporter, making use of the trade preference, the other in which it acts as an importer, choosing not to use the preferential treatment granted by country A, on the basis of its welfare attached to the two possible outcomes.

A first feasible equilibrium sees country C imposing a prohibitive tariff on its imports from country B. In this case the relevant excess supply and demand curves are given by DE"F" and AB'C'. The equilibrium is at a price in countries A and C equal to $P"_{a,c}$, and at a country B's price equal to $P"_b$. Country A imports T", country B exports $E"_b$, country C exports E_b"T".

However, country C may choose to stay on the importers' side, and impose a prohibitive tariff on its exports to country A. If this is the case, the equilibrium coincides with the one in the non-discriminatory tariff case described above.

Among these two possible equilibria country C chooses the one associated with highest welfare. In our example it is better off not switching to the exporters' de (this is because in figure 4 the area of triangle BHG is bigger than the area f the triangle E"H"G"). To make this equilibrium occur, country C must impose a tariff on its exports greater than country A's discriminatory import tariff.

Hence, even if country C is granted a level of preference that makes it able to switch from the importers' side of the market to the exporters' one, this does not necessarily imply that by doing so it is better off on a consumers' plus producers' surplus basis.

Country C's ranking of the three policy options considered leaves a certain degree of undeterminacy (Table 1). When the non-discriminatory tariff and the discriminatory tariff policy scenarios are compared, country C cannot be worse off under the latter, but may be indifferent among the two. When the no tariff and the non-discriminatory tariff scenarios are compared, country C is definitely better off under the second one. Country C is definitely better off under the discriminatory tariff rather than the free trade scenario.

Country B's ranking of the three trade policy scenarios sees free trade as the preferred one, whatever country C's policy choice is when the trade preference option is considered. With respect to the other two policy options two different rankings are possible: they may be equivalent, or the non-discriminatory tariff may make country B better off.

Country A's rankings with respect to its MSSW remains, as for the other setting considered so far, ambiguous. Country A's tariff revenue may either increase or decrease when country C finds profitable to become an exporter in the preferential trade policy scenario.

This case's findings pose an interesting problem from the empirical analysis point of view. I don't know of any static, partial equilibrium model in which,

given the domestic sides of the picture, the final outcome is determined by individual countries' a priori evaluation of different feasible equilibria. If a higher number of preferred countries is considered, the determination of the market solution becomes much more complicated. Each preferential trade beneficiary country's choice depends on that of the others, making an a priori decision as the one described above for the three countries world impossible. In order to obtain a solution, some kind of game structure among the beneficiaries of the trade preference policy needs to be assumed.

(d) country C as an importer in the non-discriminatory tariff case, as an exporter if free trading occurs, and being able to act either as an exporter or as an importer if A imposes a discriminatory tariff;

An even more counterintuitive result is obtained when country C, an importer in the basic scenario, moves to the exporters' side under country A's trade liberalization policy, and is able to play on either side of the market when the discriminatory tariff is considered.

This situation is described in figure 5. The starting scenario is, as usual, the one in which country A is imposing a non-discriminatory tariff. Country A imports I_a, country C imports I_aT, and country B is the only exporter, with a volume traded equal to T. Country A's price is P_a, countries C and B's price is $P_{b,c}$.

The elimination of the non-discriminatory tariff drives the equilibrium from G to G'. Now A is the only importer (the volume of its imports being equal to T'), while B and C are both exporting (E_b' and E_b'T', respectively). The equilibrium price in each of the three countries is equal to P'.

In the particular setting represented in figure 5 country C, which is exporting under the free trade option, is made better off by the imposition of a non-discriminatory tariff (the triangle BHG is bigger than the triangle H'G'E'), with a

result which may appear counterintuitive. The imposition of the tariff determines a price decrease which makes country C move from the exporters' side to the importers' one, and this switch is such that its welfare increases. Analogously, another possible result (not shown here) is the one that sees an importing country made better off by a trade liberalization. In this case, the elimination of the tariff drives the price up and this price increase makes the country switch from the importers' side to the exporters' one with an increase in welfare.

These possible outcomes are implicitly lost in all the empirical and theoretical research models which do not allow countries to move from one side of the market to the other as the price changes.

The trade liberalization makes country B definitely better off; its welfare gains are equal to the area $P'H'NP_{b,c}$. The sign of the change of country A's MSSW is, again, ambiguous (this change is given by the difference between areas HG'V and $P'VRP_{b,c}$).

When the implementation of the discriminatory tariff is considered, the result reached is analogous to the one analyzed above in (c). Country C faces two possible choices: to act on the exporters' side, driving the world market at the equilibrium in G", or to stay on the importers' side, leaving the world equilibrium unchanged. In the specific case represented in figure 5, country C is better off by capitalizing on the granted preferential treatment (area E"G"H" is greater than area BGH), playing on the market as an exporter. However, the other alternative might have been more profitable.

The impact on country B of the implementation of the trade preference policy is a function of country C's choice. If country C chooses to make use of the preference and to become an exporter, country B is definitely worse off, its welfare decreasing by $NMP"_cP_{b,c}$. If country C finds more profitable not moving to the exporters' side, country B welfare remains unchanged, and the non-discriminatory

tariff scenario and the discriminatory tariff one are equivalent. The free trade policy scenario is ranked first by country B whatever country C's policy choice is when the preferential trade policy is implemented.

If country C finds it profitable to switch to the exporters' side, the impact on the sum of country A's consumers' and producers' surpluses and of the tariff revenue remains ambiguous. It is given by the difference between the sum of the areas of the triangle HSG" and of the rectangle $P_aTH"P_{a,c}"$, and the area of the rectangle H"SRU.

Country C is never worse off under the discriminatory tariff than under the non-discriminatory one. On the other hand it may be definitely better off in the preferential trade scenario. When the discriminatory tariff and the non-discriminatory tariff options are equivalent, free trading is definitely ranked as the worst policy scenario. When the discriminatory tariff is strictly preferred to the non-discriminatory tariff, the first of the two is definitely ranked first, while country C's relative ranking of the non-discriminatory tariff and of the free trade options remains undetermined.

A more complex welfare function

So far, the analysis has been based on the assumption that countries B and C's welfare was given only by their producers' and consumers' surplus. Although this definition of welfare has been widely used both in theoretical and empirical analyses, its effectiveness in explaining real world trade policy choices remains vague. In this section a different definition of the welfare functions is used. The intent is to take into account a larger number of variables, representing a more likely subset of determinants in the trade policy decision making processes. These modified welfare functions are then used to test the robustness of the results obtained in the previous section, verifying to what extent they depended on the particular characterization of the welfare functions which have been used.

For reasons which will become clear later, the postulate that the sector under analysis uses inputs (both direct and indirect) which are entirely domestically produced needs to be added to the assumptions made in the first part of the paper (results derived in a partial equilibrium framework, fixed exchange rates, zero transportation costs, linear domestic demand and supply functions and perfect competition on both the world and the domestic markets).

Countries B and C's welfare functions are now defined as positive monotonic functions of three variables: consumers' plus producers' surplus (PCS), national income (Y) and foreign exchange earnings (FE). National income is defined here as the market value of the domestic production, plus the tariff revenue (if any). The assumption that the inputs (both direct and indirect) used are domestically produced makes us sure that the total producers revenue collected in the specific sector which is analyzed is entirely distributed among domestic economic agents.

Country A's welfare will be a function of W_b and W_c, as well as of PCS_a, Y_a and FE_a.

The new welfare functions may be stated as follows:

$$W_a = W_a(\ PCS_a,\ Y_a,\ FE_a,\ W_b,\ W_c\ ); \tag{5}$$

$$W_b = W_b(\ PCS_b,\ Y_b,\ FE_b); \tag{6}$$

$$W_c = W_c(\ PCS_c,\ Y_c,\ FE_c). \tag{7}$$

As before, the changes in country A's trade policy are considered exogenous, determined by a modification of the parameters of its welfare function. Country B is assumed to be acting always as an exporter.

In Table 2 countries B and C's ranking of the three trade policy scenarios, with respect to each argument of their welfare functions and with respect to the welfares themselves, are synthesized. Only two cases ("b" and "d") are here briefly discussed. Again, the reader should not have any problem in verifying the results relative to the other cases.

(b) country C as an exporter;

The different possible market equilibria when country C remains an exporter whatever policy country A implements are described in figures 6 and 7 which present, using a different scale, the domestic settings underlying the excess supply/demand functions in figures 2 and 3. Countries A, B and C domestic markets are described in portions a, b and c, respectively.

In the reference scenario, that is the one in which country A imposes a non-discriminatory tariff on its imports from both countries B and C, the equilibrium prices are equal to P_a (Fig. 6.a) in country A, to P_b (Fig. 6.b) in country B and to P_c (Fig. 6.c) in country C. P_b and P_c are equal, and are given by P_a minus country A's import tariff. Country A produces ${}_sQ_a$, consumes ${}_dQ_a$ and imports the difference between the two quantities (${}_sQ_a$ ${}_dQ_a$). Country A's income associated with the market the analysis is focused on is equal to area O_aP_aUSR ${}_sQ_a$ (the output value is equal to the area O_aP_aT ${}_sQ_a$, the tariff revenue is equal to the area TUSR). Its foreign exchange expenditure is equal to the area RS ${}_dQ_a$ ${}_sQ_a$. Country B produces ${}_sQ_b$, consumes ${}_dQ_b$ and exports ${}_dQ_b$ ${}_sQ_b$. Its income is equal to the area O_b ${}_sQ_b$ MP_b and its foreign exchange earnings are given by the area NM ${}_sQ_b$ ${}_dQ_b$. Country C produces ${}_sQ_c$, consumes ${}_dQ_c$ and exports the difference between the two quantities. Its income equals area O_c ${}_sQ_c$ EP_c , its foreign exchange earnings area EG ${}_dQ_c$ ${}_sQ_c$.

The market equilibrium which is reached if country A eliminates the tariff on its imports has been already described in detail. The volume of trade increases to ${}_sQ_a'$ ${}_dQ_a'$ (Fig. 6.a). The price is equal in all the three countries (P_a' in country A, P_b' in country B and P_c' in country C). Country A produces ${}_sQ_a'$, consumes ${}_dQ_a'$ and imports the quantity ${}_sQ_a'$ ${}_dQ_a'$. Country B produces ${}_sQ_b'$, consumes ${}_dQ_b'$ and exports ${}_dQ_b'$ ${}_sQ_b'$. Country C produces ${}_sQ_c'$, consumes ${}_dQ_c'$ and exports ${}_dQ_c'$ ${}_sQ_c'$.

The sum of consumers' and producers' surpluses increases in all three countries. The income effect of the trade liberalization is positive in countries B and C (they both produce more at an higher equilibrium price), negative in country A (which produces less at a lower equilibrium price, and, in addition, looses the tariff revenue collected in the non-discriminatory tariff policy scenario). The impact of the trade liberalization on the foreign exchange reserves is negative in country A (which imports more at a higher price) and positive in countries B and C (which export more at a higher price).

Countries B and C's welfare functions are now defined as strictly positive monotonic functions of consumers' and producers' surplus, domestic income and foreign exchange earnings. If the change in country A trade policy has a positive (negative) effect on all the three arguments of their welfare functions we may deduce that their overall welfare increases (decreases). In all the other cases the welfare change depends on the specific weights attached to each of the arguments of the welfare function. The effect of a trade liberalization on countries B and C's welfare is definitely positive.

In figure 7 the market equilibrium under the hypothesis of country A implementing the preferential trade policy is represented. The domestic demand and supply functions are identical to those in figure 6. The new equilibrium prices are P_a" , P_b" and P_c". P_a" and P_c" are equal and differ from P_b" by country A's discriminatory tariff.

Moving from the non-discriminatory tariff scenario to the discriminatory tariff one makes countries A and C's producers' plus consumers' surplus increase, while country B's decreases. Country C is better off in terms of both its foreign exchange earnings and its domestic income as well. Both are higher under the preferential tariff than in the trade liberalization case. Hence, when country C is an exporter whatever country A's policy choice is, it is definitely better off under

the preferential tariff than under either the non-discriminatory tariff or the free trade policy scenario.

Country B, on the contrary, is made worse off by the preferential tariff both in terms of its foreign exchange earnings and of its income. Country A's preferential policy is perceived by country B as the worst possible scenario, the complete trade liberalization as the most favorable.

The effects of the implementation of the preferential policy on country A itself is negative in terms of both its income and its foreign exchange expenditure. Country A's income losses are smaller in the discriminatory tariff scenario than in the free trade one. The ranking of these two policy options with respect to the foreign exchange expenditure remains ambiguous. In the discriminatory tariff scenario country A's imports are smaller than in the free trade one, but it pays a portion of them ($_dQ_c$" $_sQ_c$") at a price (P_c") which is higher than the one prevailing when free trading occurs (P_a' in Fig. 6), a portion of them ($_dQ_b$" $_sQ_b$") at a price (P_b") which is below that level.

(d) country C as an importer in the non-discriminatory tariff case, as an exporter if free trading occurs, and being able to act either as an exporter or as an importer if A imposes a discriminatory tariff;

This case is presented in figures 8 and 9. In figure 8 the non-discriminatory tariff and the free trade equilibria are shown.

If the import tariff is eliminated, country C is better off both in terms of its income and in terms of its foreign exchange reserves. However, because the impact on the consumers' plus producers' surplus is uncertain, the sign of the change in its welfare remains, in general, undetermined. Country B, on the contrary, is better off with respect to all three arguments of its welfare function. The trade liberalization makes country A's consumers' and producers' surplus increase and its income and its foreign exchange reserves decrease.

When the trade preferential policy is considered, as discussed above, two equilibria are feasible. The one which takes place is the one associated with country C's highest welfare. If country C chooses to stay on the importers' side of the market, the equilibrium does not move from the reference one. If country C is better off moving from the importers' side to the exporters' one, then the equilibrium prices are equal (Fig. 9) to P_a" in country A, to P_c" in country C (these two prices are equal) and to P_b" in country B (this price is equal to the prices in the other two countries minus country A's import tariff). Country A sees its producers' and consumers' surplus increase, and its income decrease. The impact on its foreign reserve earnings remains ambiguous (Q_a"I_a" and $_dQ_b$" $_sQ_b$" in Fig. 9 are equal).

Country B is worse off in terms of all the three arguments of its welfare function. Country C is better off in terms of its income and of its foreign exchange earnings, but the impact on its consumers' and producers' surplus remains undetermined. Its overall welfare, however, increases.

Whatever position country C chooses, country B's highest welfare is definitely associated with the free trade alternative. If country C chooses to remain on the importers' side of the market when country A implements the trade preferential policy, than country B finds the non-discriminatory tariff and the discriminatory tariff options equivalent. However, the non-discriminatory tariff scenario is preferred to the discriminatory tariff one if country C finds it more convenient to capitalize on the trade preference granted by country A. Country C's ranking remains partially undetermined. If it does not make use of the preference (i.e. it does not switch to the exporters' side of the market) the discriminatory tariff scenario and the non-discriminatory one are equivalent, but it cannot be determined if the level of the welfare associated with these scenarios is greater, equal or smaller than the one associated with the free trade option. If country C moves to

the exporters' side of the market when country A offers the opportunity of a preferred treatment of its imports coming from country C, the discriminatory tariff policy scenario is definitely the most attractive for country C. This is (a) because the discriminatory tariff policy scenario is certainly preferred to the non-discriminatory one (otherwise country C would not become an exporter), and (b) because in the free trade case all the arguments of the welfare function are smaller than those in the discriminatory tariff policy scenario.

Conclusions

The paper's main goal was to comparatively evaluate, on a theoretical basis, the welfare implications of a preferential tariff reduction with those of a generalized tariff reduction. The analysis has been developed using an innovating model which allows the switching of the beneficiary country from one side of the market to the other as the price changes. Two different sets of welfare functions have been considered. The results emerged when a more basic, and more traditional, definition of the welfare functions has been used, may be synthesized as follows:

(i) whatever the position of the beneficiary country on the world market, it is always better off under a preferential tariff reduction than under a generalized tariff reduction;

(ii) in cases (a) and (c) the beneficiary country is made worse off (with respect to the existence of a non-discriminatory tariff) by a generalized tariff reduction. This result may be true as well in case (d);

(iii) from the donor country's point of view, for a given beneficiary country benefit, the cost under the generalized tariff reduction is always greater than under the preferential tariff reduction;

(iv) the non-targeted country, under the hypothesis made in the paper (i.e. that it is an exporter whatever country A's policy is), is always better off in the generalized tariff reduction scenario than in the preferential tariff reduction one.

When more complex, and less traditional, welfare functions have been used, the following results have been reached:

(i) if the beneficiary country is already exporting in the reference scenario it is definitely better off under a preferential tariff reduction than under a generalized tariff reduction. In most of the other cases its relative ranking of these trade policy alternatives remains undetermined. However, in all the cases considered, a trade liberalization will never make the beneficiary country definitely better off with respect to a preferential trade policy scenario;

(ii) in most of the cases considered, the beneficiary country may be made worse off (with respect to the existence of a non-discriminatory tariff) by a generalized tariff reduction. On the other hand, when the case in which the beneficiary country is always an exporter - whatever trade policy country A implements - is considered, it is definitely made better off by a trade liberalization;

(iii) from the donor country point of view, for a given beneficiary country welfare gain, the cost in terms of both income and foreign exchange reserves is always greater under the generalized tariff reduction option than under the preferential tariff reduction;

(iv) the non-targeted country, under the hypotheses made (i.e. that it is an exporter whatever country A's policy is), is always better off in the generalized tariff reduction scenario than in the preferential tariff reduction one.

The results obtained in the second part of the paper, even if less robust, are fully consistent and largely confirm those emerged in the first part, when a much more simple specification of the welfare function was considered. In particular we may conclude that, based on the results of the analysis, the positions taken by many importing and exporting developed countries on the issue of less developed

countries' interests with respect to a preferential versus a generalized tariff reduction, appear to be fully justified on the basis on their own interests. However, when the interests of the less developed countries are considered, the paper's findings suggest that there is no evidence whatsoever that they may be assumed a priori to be better off under a generalized tariff reduction than under a preferential tariff reduction. On the contrary, for those developing countries which are already exporting in the scenario characterized by the existence of non discriminatory tariffs the opposite result will definitely be true.

Aknowledgements

I would especially like to thank Alex McCalla and Quirino Paris for their many valuable suggestions. I am deeply grateful for the helpful comments and criticism of Michele De Benedictis, Lovell Jarvis and Gordon King.

References

Blackhurst, R., 1972, General versus Preferential Tariff Reduction for LDC Exports: an Analysis of the Welfare Effects. Southern Economic Journal., 40: 350-362.

Johnson, H.G., 1957 and 1958, A Marshallian Analysis of Custom Unions. Indian Journal of Economics., 148: 39-48, and 153: 177-181; reprinted in: Johnson, H.G., (1967), Money Trade and Economical Growth. Harvard University Press, Cambridge, Mass: 63-74.

McCulloch, R. and Pinera J., 1977, Trade as Aid: the Political Economy of Tariff Preferences for Developing Countries. American Economic Review. 67: 959-967.

World Bank, 1986, World Development Report 1986. World Bank, D.C, 256 pp.

Appendix

The appendix developes mathematically some of the paper's results using a diagrammatical approach. The assumptions the appendix builds on are those stated in the paper.

First, equilibrium conditions are derived, then comparative statics results are used to prove the conclusions reached in the paper, which are summarized in Tables 1 and 2, for two of the four cases taken into consideration: those labeled above as "a" and "b". The use of a comparative statics approach, in fact, precludes the possibility of proving the results when the targeted country switches from being an exporter to being an importer, or vice versa, as the equilibrium price changes.

Let:

$$S_a = \alpha_a + \beta_a p_a \quad ; \tag{A1}$$

$$S_b = \alpha_b + \beta_b p_b \quad ; \tag{A2}$$

$$S_c = \alpha_c + \beta_c p_c \quad ; \tag{A3}$$

be the domestic supply functions; and

$$D_a = \gamma_a + \delta_a p_a \quad ; \tag{A4}$$

$$D_b = \gamma_b + \delta_b p_b \quad ; \tag{A5}$$

$$D_c = \gamma_c + \delta_c p_c \quad ; \tag{A6}$$

be the domestic demand functions in the three countries, with $\gamma_i > \alpha_i > 0$, $\beta_i > 0$ and $\delta_i < 0$, (i=a,b,c); let:

$$Q_a = S_a - D_a = a + bp_a \quad ; \tag{A7}$$

$$Q_b = S_b - D_b = c + dp_b \quad ; \tag{A8}$$

$$Q_c = S_c - D_c = e + fp_c \quad ; \tag{A9}$$

be the correspondent excess demand/supply functions, with (given the assumptions on the parameters in A1-A6) a, c, e < 0, and b, d, f > 0. A positive Q implies that the country is an exporter (its exports being equal to Q), while a negative Q implies that the country is an importer (its imports being equal to -Q).

Under the assumptions made in the paper the following equilibrium price linkages hold:

$$p_b^* = p_a^* - t_{ab} \quad ; \tag{A10}$$

$$p_c^* = p_a^* - (1-\phi)t_{ac} - \phi t_{ab} \quad ; \tag{A11}$$

where t_{ab} and t_{ac} are the tariffs imposed by country A on its imports from countries B and C, respectively; ϕ is a dummy variable, which is equal to 0 when country C is an exporter, to 1 when it is an importer, and the * indicates equilibrium values.

By imposing a market clearance condition, the equilibrium prices can be easily obtained:

$$p_a^* = [(d+f\phi)t_{ab} + f(1-\phi)t_{ac} - a - c - e]/(b+d+f) \; ; \tag{A12}$$

$$p_b^* = [(d+f\phi)t_{ab} + f(1-\phi)t_{ac} - a - c - e]/(b+d+f) - t_{ab} \; ; \tag{A13}$$

$$p_c^* = [(d+f\phi)t_{ab} + f(1-\phi)t_{ac} - a - c - e]/(b+d+f) - (1-\phi)t_{ac} - \phi t_{ab} \; . \tag{A14}$$

In Figure A1, SS' represents an excess supply/demand function as those given in A7-A9. The cross hutched area represents the gains from trade (i.e. the amount by which domestic consumers' and producers' surplus increases as a result of international trading) when the equilibrium price is p_1 and, as a result, the country is exporting. The area emphasized by the vertical lines gives the gains from trade when the equilibrium price is p_2 and the country is importing. These gains from trade are equal, respectively, to $.5(p_1-c)Q_1$ and $.5(p_2-c)Q_2$ (note that both p_2-c and Q_2 are less than zero).

Hence, countries A, B and C's producers' and consumers' surplus (CPS) and country A's Market Specific Social Welfare (MSSW) may be defined as follows:

$$PCS_a^* = DPCS_a + .5(p_a^* + a/b)Q_a^* \quad ; \tag{A15}$$

$$PCS_b^* = DPCS_b + .5(p_b^* + c/d)Q_b^* \quad ; \tag{A16}$$

$$PCS_c^* = DPCS_c + .5(p_c^* + e/f)Q_c^* \quad ; \tag{A17}$$

$$MSSW_a^* = PCS_a^* - \phi t_{ab}Q_a^* + (1-\phi)(t_{ab}Q_b^* + t_{ac}Q_c^*) \; ; \tag{A18}$$

where $DPCS_i$ (i = a,b,c) equals country i's closed economy domestic consumers' and producers' surplus.

Based on the definitions given in the paper, foreign exchange earnings/expenditures (FE) and incomes (Y) are given by:

$$FE_a^* = \phi p_b^* Q_a^* - (1-\phi)(p_b^* Q_b^* + p_c^* Q_c^*) \; ; \tag{A19}$$

$$FE_b^* = p_b^* Q_b^* \; ; \tag{A20}$$

$$FE_c^* = p_c^* Q_c^* \; ; \tag{A21}$$

and:

$$Y_a^* = p_a^*(\alpha_a + \beta_a p_a^*) - \phi t_{ab} Q_a^* + (1-\phi)(t_{ab} Q_b^* + t_{ac} Q_c^*) \; ; \tag{A22}$$

$$Y_b^* = p_b^*(\alpha_b + \beta_b p_b^*) \; ; \tag{A23}$$

$$Y_c^* = p_c^*(\alpha_c + \beta_c p_c^*) \; . \tag{A24}$$

Note that when FE is greater than zero it is equal to the country's foreign exchange earnings, when it is less than zero it is equal to the country's foreign exchange expenditure with the sign reversed.

As we did in the paper, it is assumed that the reference scenario is the one in which country A imposes a non-discriminatory tariff (NDT) on its imports from countries B and C (i.e. $t_{ab}=t_{ac}=t$). Comparative statics results are then derived assuming that country A (i) moves toward free trading (FT) by lowering across the board its non-discriminatory tariff t, and (ii) moves toward a discriminatory tariff (DT) by lowering t_{ac}, while leaving t_{ab} unchanged.

First let's derive the impact on equilibrium prices and quantities of both the FT and the DT policy choices:

$$\delta p_a^*/\delta t = (d+f)/(b+d+f) > f(1-\phi)/(b+d+f) = \delta p_a^*/\delta t_{ac} \geq 0 \; ; \tag{A25}$$

$$\delta p_b^*/\delta t = -b/(b+d+f) < 0 \leq f(1-\phi)/(b+d+f) = \delta p_b^*/\delta t_{ac} \; ; \tag{A26}$$

$$[\delta p_c^*/\delta t_{ac}]_{\phi=0} = -(b+d)/(b+d+f) < -b/(b+d+f) = \delta p_c^*/\delta t < 0 = [\delta p_c^*/\delta t_{ac}]_{\phi=1} \; ; \tag{A27}$$

$$\delta Q_a^*/\delta t = b(d+f)/(b+d+f) > bf(1-\phi)/(b+d+f) = \delta Q_a^*/\delta t_{ac} \geq 0 \; ; \tag{A28}$$

$$\delta Q_b^*/\delta t = -db/(b+d+f) < 0 \leq df(1-\phi)/(b+d+f) = \delta Q_b^*/\delta t_{ac} \; ; \tag{A29}$$

$$[\delta Q_c^*/\delta t_{ac}]_{\phi=0} = -f(b+d)/(b+d+f) < -fb/(b+d+f) = \delta Q_c^*/\delta t < 0 = [\delta Q_c^*/\delta t_{ac}]_{\phi=1} \cdot \quad \text{(A30)}$$

These results will be needed later on in this Appendix. However, it is worthwhile at this point to underline some of the information they provide. In particular (keeping in mind that the case of a price change such that country C moves from being an importer to being an exporter, or vice versa, is now ruled out) the following conclusions may be drawn:

- no matter what the position of country C on the market is, country A's imports increase more if it uniformly lowers its tariff than if it lowers its tariff on its imports from country C only (A28);
- when country A lowers its tariff across the board country B's exports increase. On the contrary, when country A lowers its tariff on its imports from country C only country B's exports either decrease (if country C is an exporter), or remain unchanged (if country C is an importer) (A29);
- if country C is an exporter, its exports increase more under the preferential tariff reduction than under the generalized tariff reduction. If it is an importer, its imports decrease under a generalized tariff reduction and do not change under a preferential tariff reduction (A30).

(a) <u>country C as an importer</u>

Let's consider first the case in which country C is an importer whatever policy country A implements.

If this is the case, the impacts of country A uniformly lowering its tariff, or lowering its tariff on its imports from country C only, on each country's producers' and consumers' surpluses, may be described as follows:

$$\delta PCS_a^*/\delta t = .5[(\delta p_a^*/\delta t)Q_a^* + (p_a^*+a/b)(\delta Q_a^*/\delta t)] < 0 = .5[(\delta p_a^*/\delta t_{ac})Q_a^* + (p_a^*+a/b)(\delta Q_a^*/\delta t_{ac})] = \delta PCS_a^*/\delta t_{ac} \; ; \quad \text{(A31)}$$

$$\delta PCS_b^*/\delta t = .5[(\delta p_b^*/\delta t)Q_b^* + (p^*_b+c/d)(\delta Q_b^*/\delta t)] < 0 = .5[(\delta p_b^*/\delta t_{ac})Q_b^* + (p_b^*+c/d)(\delta Q_b^*/\delta t_{ac})] = \delta PCS_b^*/\delta t_{ac} \; ; \quad \text{(A32)}$$

$$\delta PCS_c^*/\delta t = .5[(\delta p_c^*/\delta t)Q_c^* + (p_c^*+e/f)(\delta Q_c^*/\delta t)] > 0 = .5[(\delta p_c^*/\delta t_{ac})Q_c^* + (p_c^*+e/f)(\delta Q_c^*/\delta t_{ac})] = \delta PCS_c^*/\delta t_{ac} \; ; \quad (A33)$$

$$\delta MSSW_a^*/\delta t = \delta PCS_a^*/\delta t + (\delta Q_b^*/\delta t)t + Q_b^* \; ? \; 0 = \delta PCS_a^*/\delta t_{ac} + (\delta Q_b^*/\delta t_{ac})t_{ab} = \delta MSSW_a^*/\delta t_{ac} \quad (A34)$$

(A30), for example, holds because: $\delta p_a^*/\delta t > 0$ (from A25), $Q_a^* < 0$ (country A being assumed to be an importer), $p_a^*+a/b < 0$ (for the same reason), $\delta Q_a^*/\delta t > 0$ (A28), $\delta p_a^*/\delta t_{ac} = 0$ (A25, country C being assumed to be an importer), and $\delta Q_a^*/\delta t_{ac} = 0$ (A28).

Analogously, the impact of the generalized and the preferential tariff reduction on foreign exchange earnings/expenditures and incomes may be described as follows:

$$\delta FE_a^*/\delta t > 0 = \delta FE_a^*/\delta t_{ac} \; ; \quad (A35)$$

$$\delta FE_b^*/\delta t < 0 = \delta FE_b^*/\delta t_{ac} \; ; \quad (A36)$$

$$\delta FE_c^*/\delta t \; ? \; 0 = \delta FE_c^*/\delta t_{ac} \; ; \quad (A37)$$

$$\delta Y_a^*/\delta t = (\delta p_a^*/\delta t)(\alpha_a + \beta_a p_a^*) + p_a^*\beta_a(\delta p_a^*/\delta t) + (\delta Q_b^*/\delta t)t + Q_b^* \; ? \; 0 = \delta Y_a^*/\delta t_{ac} \; ; \quad (A38)$$

$$\delta Y_b^*/\delta t < 0 = \delta Y_b^*/\delta t_{ac} \; ; \quad (A39)$$

$$\delta Y_c^*/\delta t < 0 = \delta Y_c^*/\delta t_{ac} \; . \quad (A40)$$

The effects of the two country A's policy changes under consideration may be summarized as follows:

- when country C is an importer nothing happens if country A lowers t_{ac} only (A31-A40);

when country A uniformly lowers its import tariff:

- country A's and B's producers' and consumers' surplus increase (A31 and A32), country C's decreases (A33), and the sign of the impact on country A's Market Specific Social Welfare remains undetermined (A34);
- its foreign exchange expenditure increases (A35, note that $FE_a<0$), country B's earnings increase (A36), while the sign of the change on country C's foreign exchange expenditure is in general ambiguous (A37);

- while the impact of a marginal reduction across the board of country A's tariff on its own income remains in general undetermined (A39), when, as assumed in the paper, it grants countries B and C tariff-free access (i.e. t=0) its income definitely decreases;
- the impact on country B and C's income is definitely positive (A39 and A40).

(b) country C as an exporter

The impact of two policy changes considered when country C is an exporter no matter what country A's policy choice is, may be described as follows:

$$\delta PCS_a^*/\delta t < \delta PCS_a^*/\delta t_{ac} < 0 \; ; \tag{A41}$$

$$\delta PCS_b^*/\delta t < 0 < \delta PCS_b^*/\delta t_{ac} \; ; \tag{A42}$$

$$\delta PCS_c^*/\delta t_{ac} < \delta PCS_c^*/\delta t < 0 \; ; \tag{A43}$$

$$\delta MSSW_a^*/\delta t \; ? \; 0 \; ? \; \delta MSSW_a^*/\delta t_{ac} \; ; \tag{A44}$$

$$\delta FE_a^*/\delta t > 0 \; ? \; \delta FE_a^*/\delta t_{ac} \; ; \tag{A45}$$

$$\delta FE_b^*/\delta t < 0 < \delta FE_b^*/\delta t_{ac} \; ; \tag{A46}$$

$$\delta FE_c^*/\delta t_{ac} < \delta FE_c^*/\delta t < 0 \; ; \tag{A47}$$

$$\delta Y_a^*/\delta t \; ? \; 0 \; ? \; \delta Y_a^*/\delta t_{ac} \; ; \tag{A48}$$

$$\delta Y_b^*/\delta t < 0 < \delta Y_b^*/\delta t_{ac} \; ; \tag{A49}$$

$$\delta Y_c^*/\delta t_{ac} < \delta Y_c^*/\delta t < 0 \; . \tag{A50}$$

Hence, when country C is assumed to be an exporter whatever policy country A implements:

- country A's producers' and consumers' surplus increases more under the generalized tariff reduction than under the preferential one (A41). The change in its Market Specific Social Welfare remains ambiguous under both scenarios (A44). Its foreign exchange expenditure is definitely higher when the generalized tariff reduction occurs, while the result is ambiguous when it lowers t_{ac} only (A45). If marginal decreases in the tariffs are considered the sign of the changes in country A's income remain ambiguous (A48). However, if, as is the case in the paper, a free

trade scenario (t=0) is compared with the granting to country C of a preferential tariff-free market access (t_{ab} unchanged, t_{ac}=0), then country A's income decreases in both cases, but the drop is larger when free trade occurs;

- country B's is better off in terms of all terms of its welfare function when the generalized tariff reduction takes place, and worse off when country A lowers the tariff on its imports from country C only (A42, A46, A49);
- country C, on the contrary, is better off under both country A's policy choices. However, the increases in its consumers' and producers' surplus, foreign exchange earnings and income are all higher when the preferential tariff reduction occurs (A43, A47, A50).

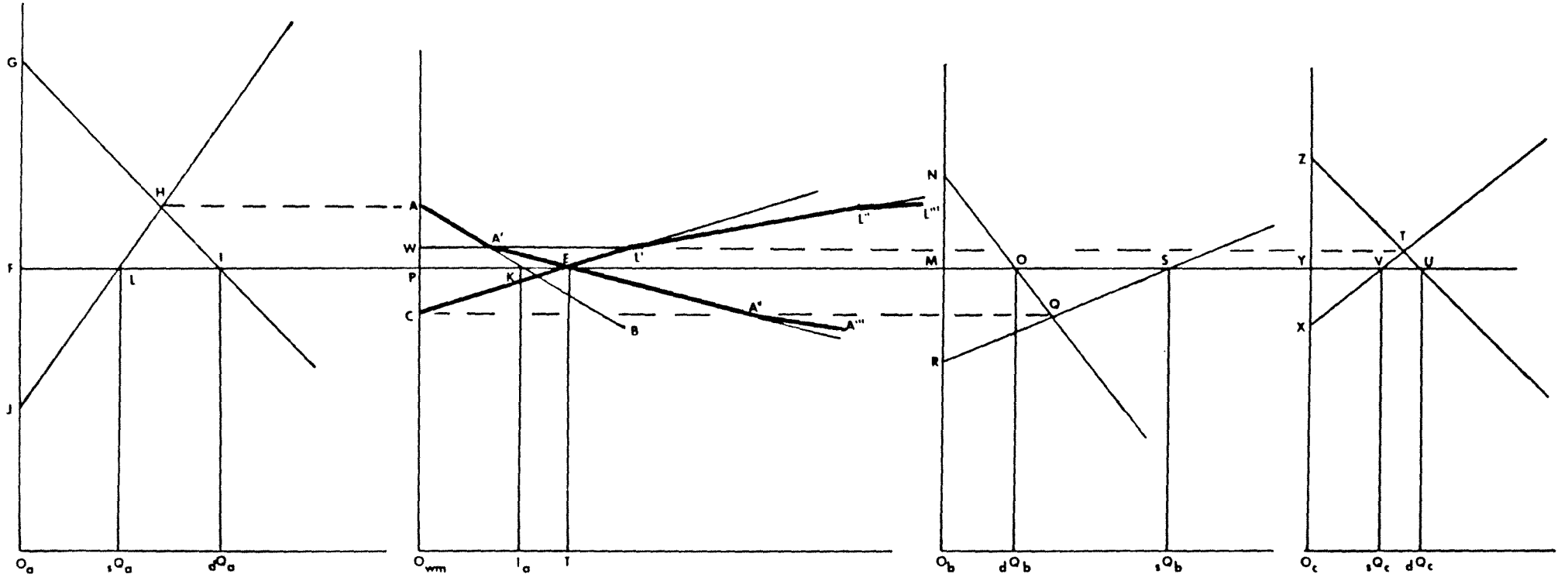


Fig. 1 : Three country world trade equilibrium.

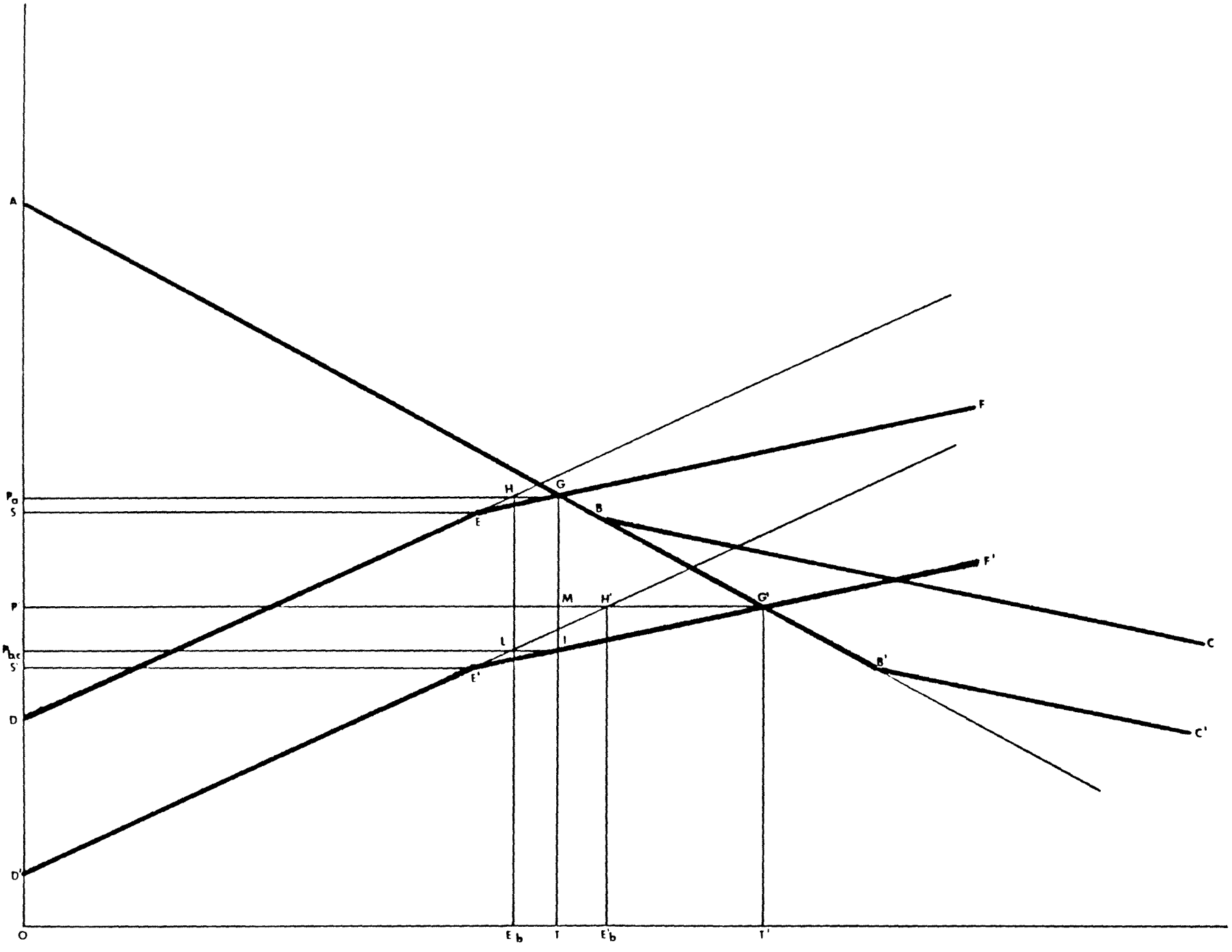


Fig. 2 : Case "b". Generalized tariff reduction.

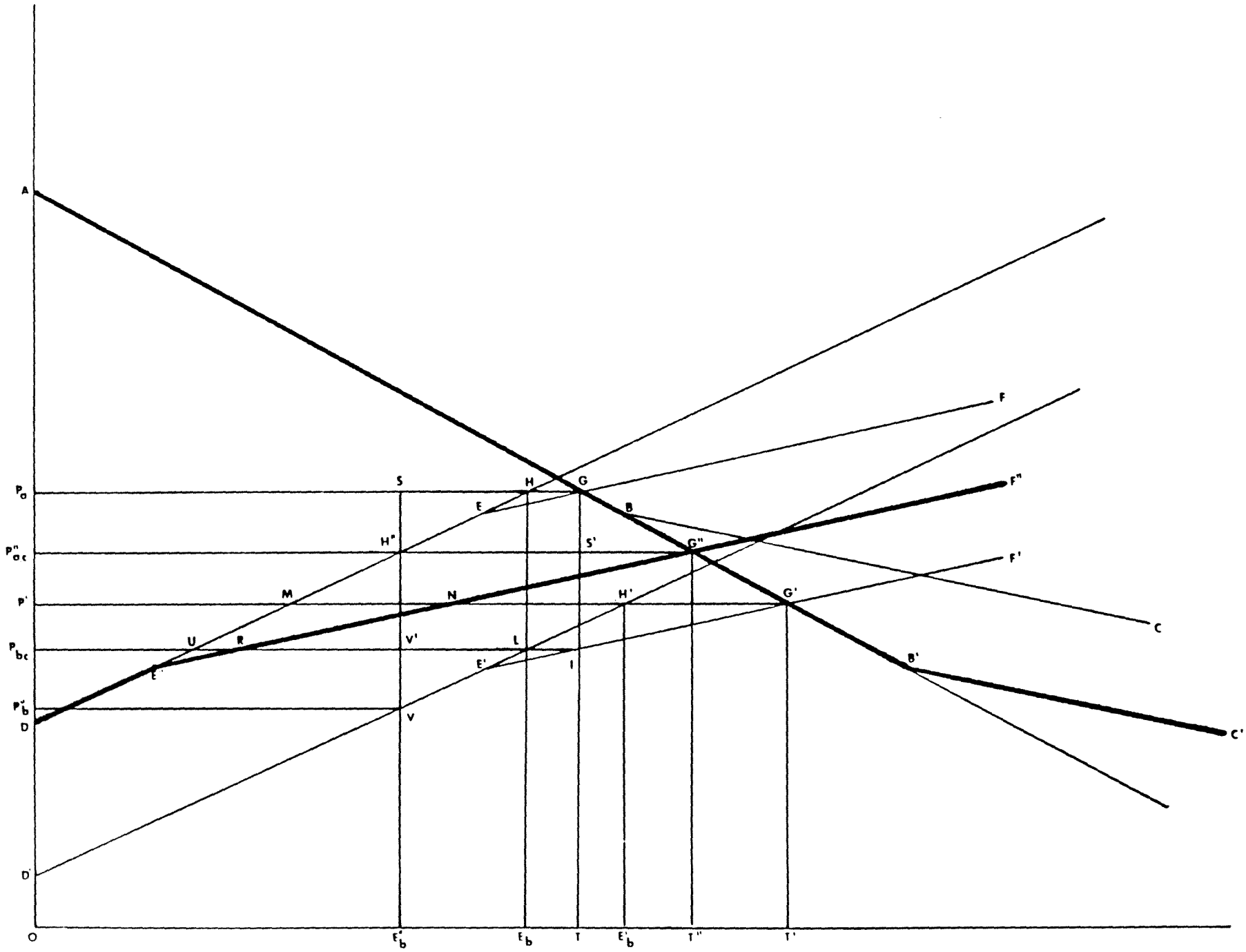


Fig. 2. - Case "b". Preferential tariff reduction.

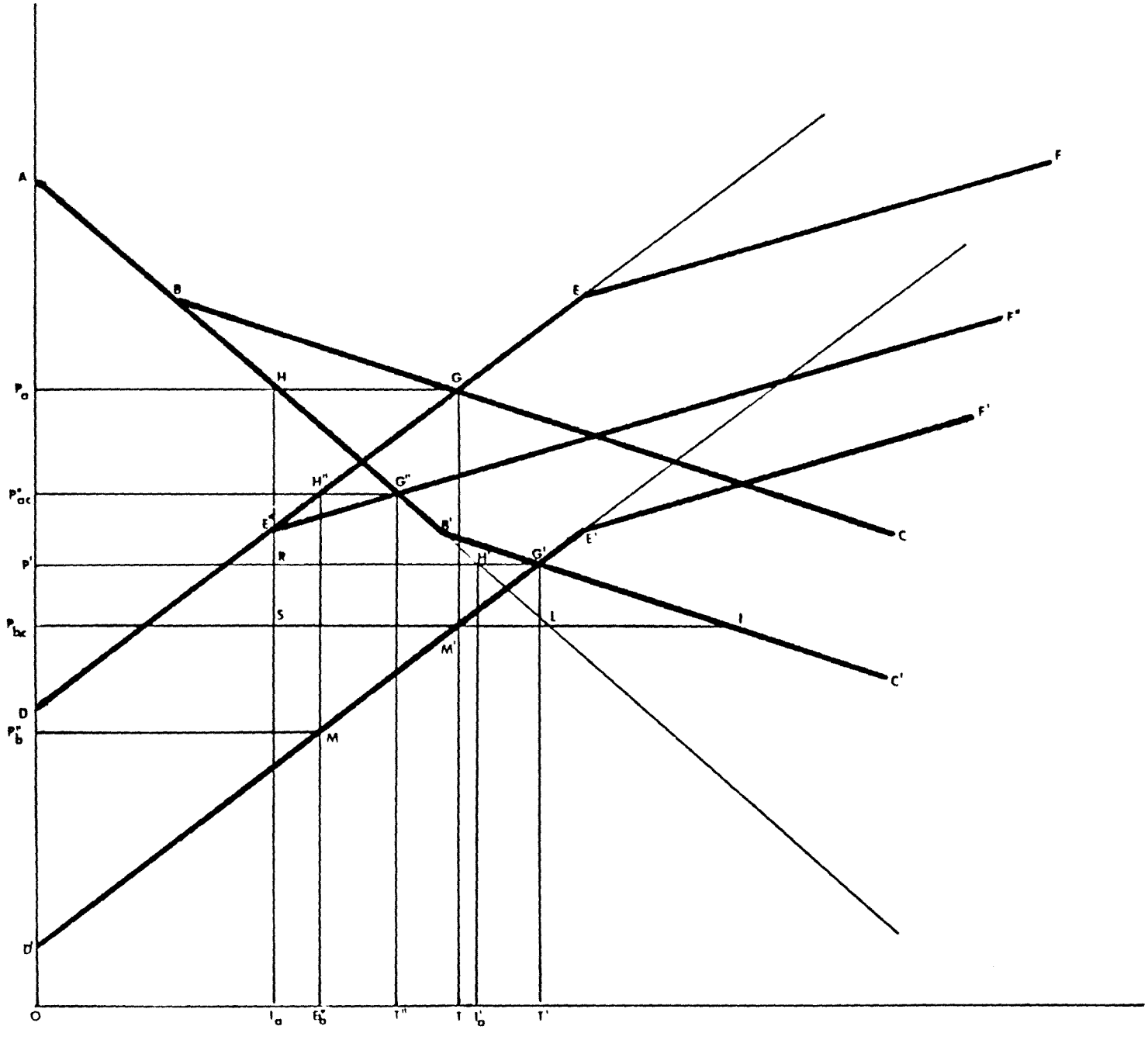


Fig. 4 : Case "c". Generalized and preferential tariff reduction.

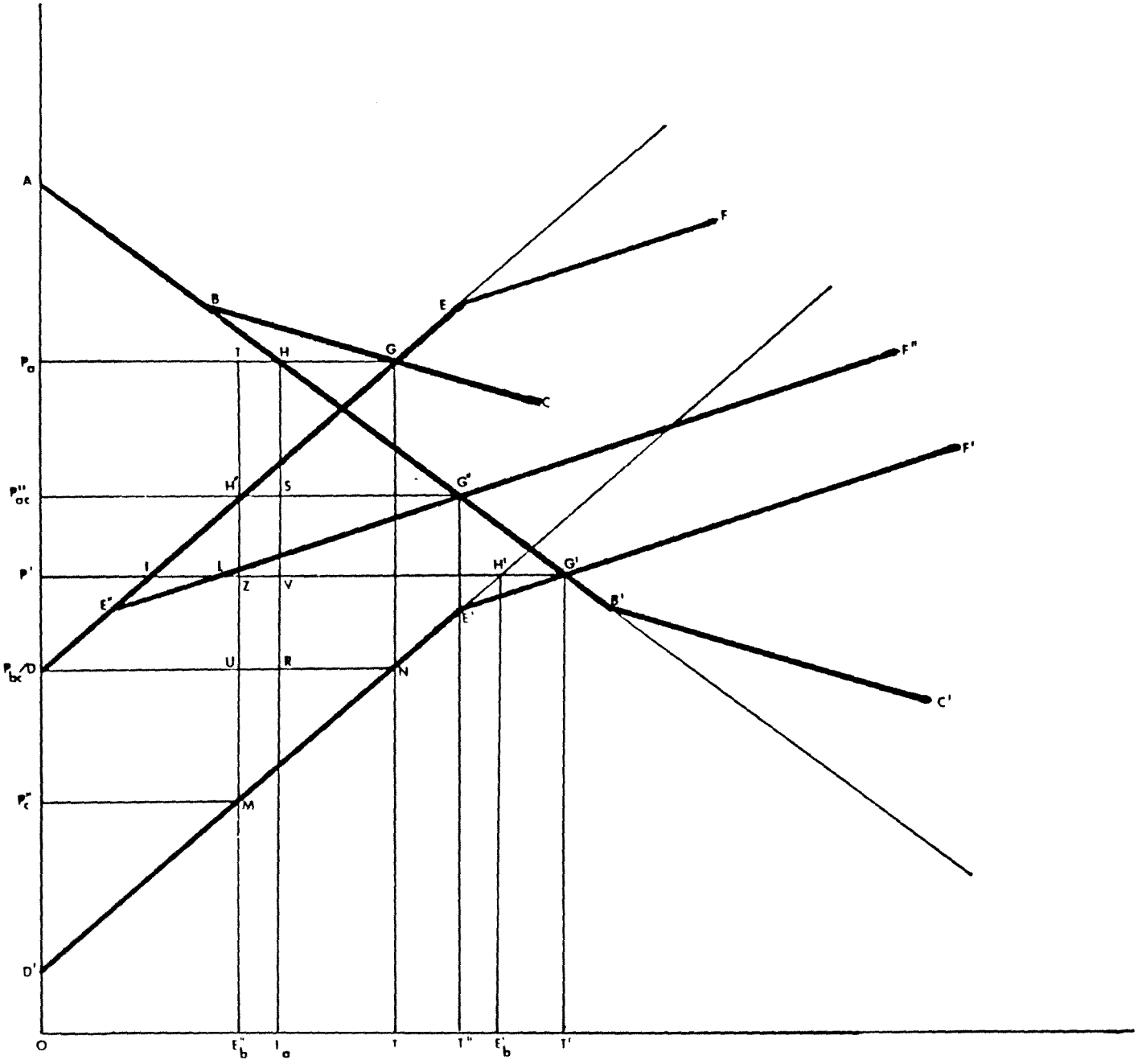


Fig. 5 : Case "d". Generalized and preferential tariff reduction.

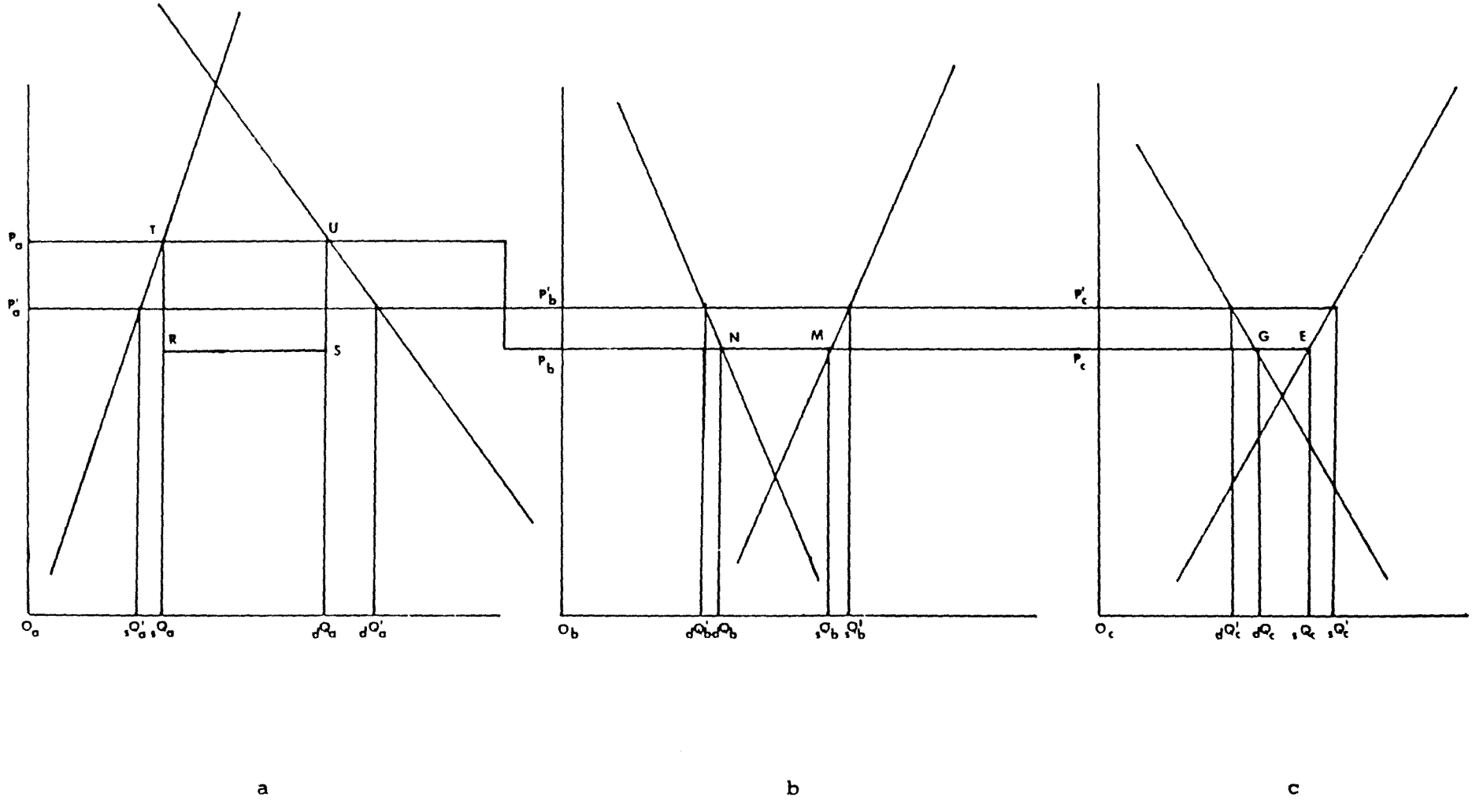


Fig. 6 : Case "b", using a more complex definition of the welfare functions. Generalized tariff reduction.

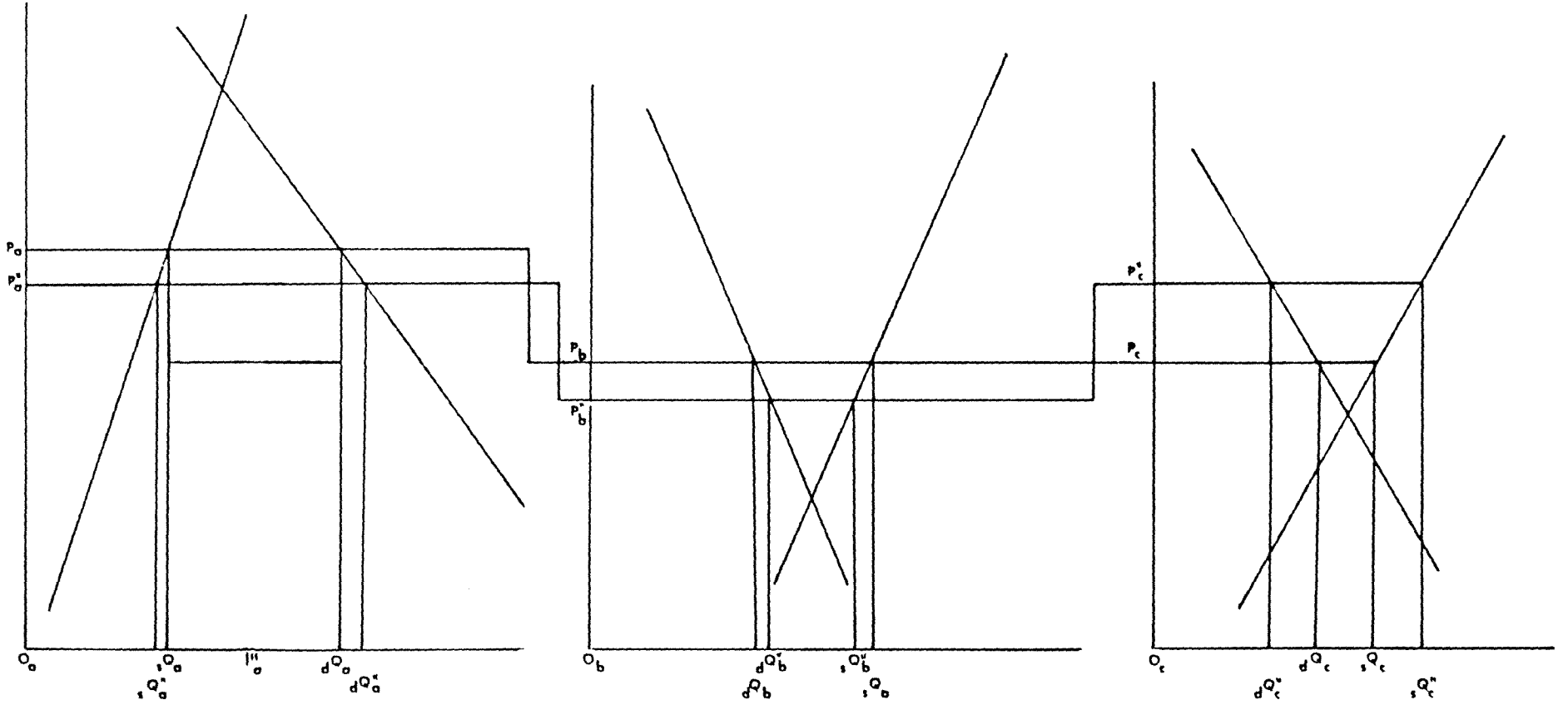


Fig. 7 : Case "b", using a more complex definition of the welfare functions. Preferential tariff reduction.

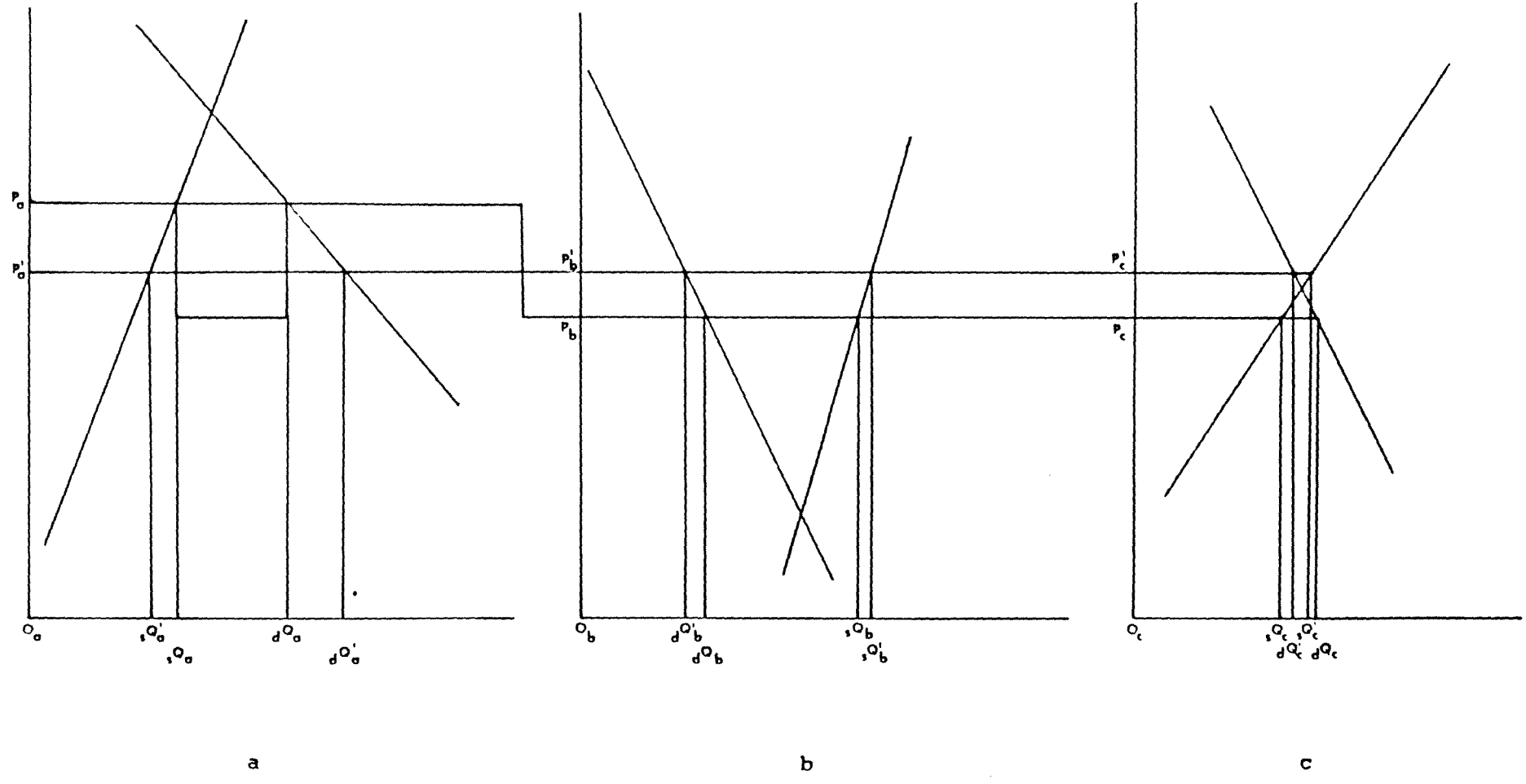


Fig. 8 : Case "d", using a more complex definition of the welfare functions. Generalized tariff reduction.

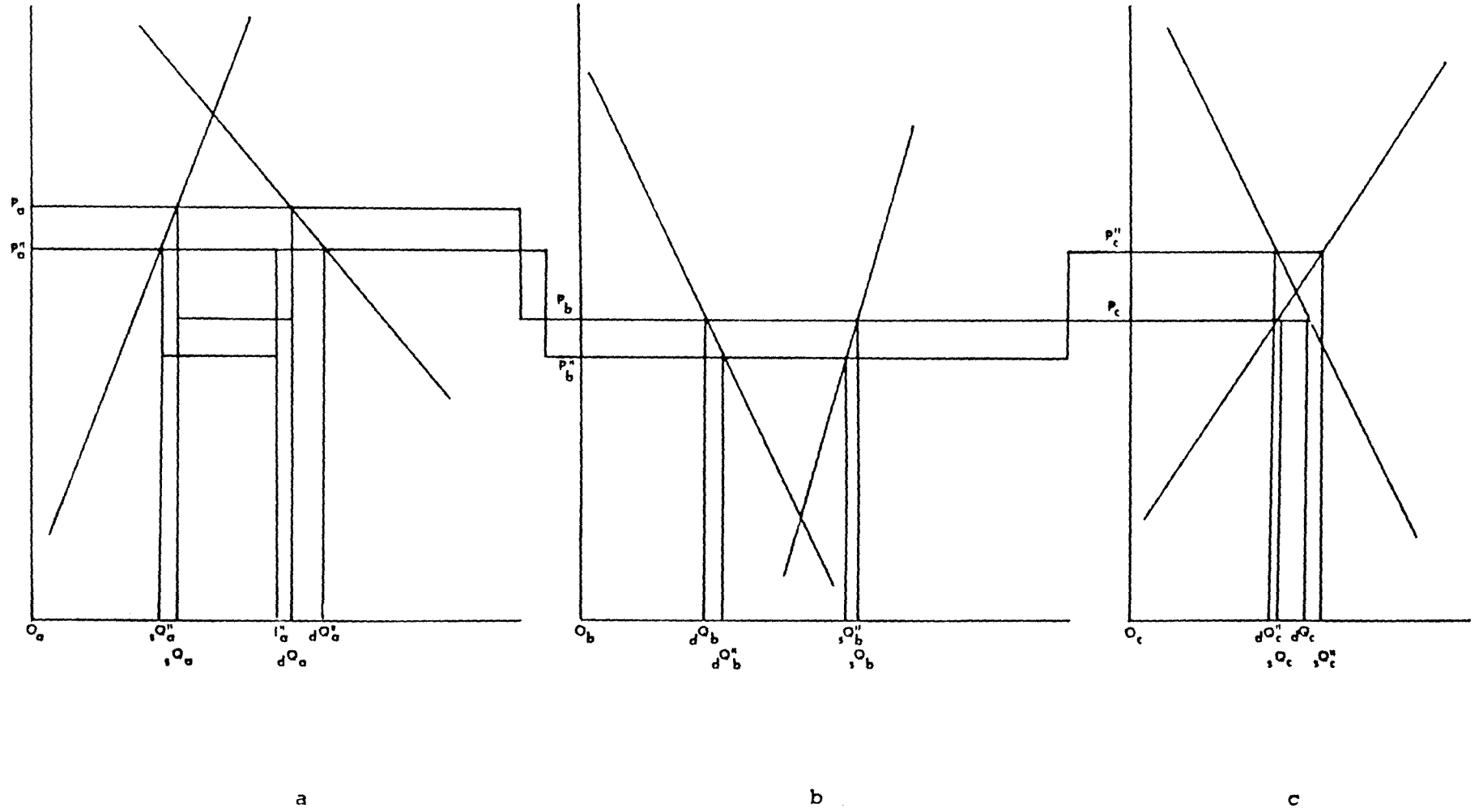


Fig. 9 : Case "d", using a more complex definition of the welfare functions. Preferential tariff reduction.

Table 1 : Generalized vs. preferential tariff reduction. A comparative analysis of the welfare impacts.

	country A			country B	country C
	CPS	TR	MSSW	W	W
Scenario: a					
NDT to FT	+	-	?	+	-
NDT to DT	=	=	=	=	=
Rankings: NDT	2	1	?	2	1
DT	2	1	?	2	1
FT	1	3	?	1	3
Scenario: b					
NDT to FT	+	-	?	+	+
NDT to DT	+	-	?	-	+
Rankings: NDT	3	1	?	2	3
DT	2	2	?	3	1
FT	1	3	?	1	2
Scenario: c					
NDT to FT	+	-	?	+	-
NDT to DT:					
i. C import.	=	=	=	=	=
ii. C export.	+	?	?	-	+
Rankings:	i. ii.	i. ii.	i. ii.	i. ii.	i. ii.
NDT	2 3	1 ?	? ?	2 2	1 2
DT	2 2	1 ?	? ?	2 3	1 1
FT	1 1	3 3	? ?	1 1	3 3
Scenario: d					
NDT to FT	+	-	?	+	? (i:-,ii:?)
NDT to DT:					
i. C import.	=	=	=	=	=
ii. C export.	+	?	?	-	+
Rankings:	i. ii.	i. ii.	i. ii.	i. ii.	i. ii.
NDT	2 3	1 ?	? ?	2 2	1 ?
DT	2 2	1 ?	? ?	2 3	1 1
FT	1 1	3 3	? ?	1 1	3 ?

NDT: Non Discriminatory Tariff

DT : Discriminatory Tariff

FT : Free Trade

CPS: Consumers' plus Producers' surplus

TR : Tariff Revenue

MSSW : CPS + TR

W : Welfare

Table 2 : Generalized vs. preferential tariff reduction. A comparative analysis of the welfare impact using a more complex welfare function.

		country A			country B				country C			
		CPS	Y	FE	CPS	Y	FE	W	CPS	Y	FE	W
Scenario: a												
NDT to FT		+	-	-	+	+	+	+	-	+	?	?
NDT to DT		=	=	=	=	=	=	=	=	=	=	=
Rankings:	NDT	2	1	1	2	2	2	2	1	2	?	?
	DT	2	1	1	2	2	2	2	1	2	?	?
	FT	1	3	3	1	1	1	1	3	1	?	?
Scenario: b												
NDT to FT		+	-	-	+	+	+	+	+	+	+	+
NDT to DT		+	-	-	-	-	-	-	+	+	+	+
Rankings:	NDT	3	1	1	2	2	2	2	3	3	3	3
	DT	2	2	?	3	3	3	3	1	1	1	1
	FT	1	3	?	1	1	1	1	2	2	2	2
Scenario: c												
NDT to FT		+	-	-	+	+	+	+	-	+	?	?
NDT to DT:												
i.		=	=	=	=	=	=	=	=	=	=	=
ii.		+	-	?	-	-	-	-	?	+	+	+
Rankings:		i. ii.	i. ii.	i. ii.	i. ii.	i. ii.	i. ii.	i. ii.	i. ii.	i. ii.	i. ii.	i. ii.
	NDT	2 3	1 1	1 ?	2 2	2 2	2 2	2 2	1 ?	2 3	? ?	? ?
	DT	2 2	1 2	1 ?	2 3	2 3	2 3	2 3	1 ?	2 1	? 1	? ?
	FT	1 1	3 3	3 ?	1 1	1 1	1 1	1 1	3 ?	1 2	? ?	? ?
Scenario: d												
NDT to FT		+	-	-	+	+	+	+	?	+	+	?
NDT to DT:												
i.		=	=	=	=	=	=	=	=	=	=	=
ii.		+	-	?	-	-	-	-	?	+	+	+
Rankings:		i. ii.	i. ii.	i. ii.	i. ii.	i. ii.	i. ii.	i. ii.	i. ii.	i. ii.	i. ii.	i. ii.
	NDT	2 3	1 1	1 ?	2 2	2 2	2 2	2 2	? ?	2 3	2 3	? ?
	DT	2 2	1 2	1 ?	2 3	2 3	2 3	2 3	? ?	2 1	2 1	? 1
	FT	1 1	3 3	3 ?	1 1	1 1	1 1	1 1	? ?	1 2	1 2	? ?

NDT : Non Discriminatory Tariff
FT : Free Trade
DT : Discriminatory Tariff

CPS : Consumers' plus producers' surplus
Y : domestic income
FE : Foreign Exchange earnings

W : Welfare
i : country C importing
ii : country C exporting