BASIC GOODS, THE EFFECTS OF COMMODITY TRANSFERS AND THE INTERNATIONAL ECONOMIC ORDER

Graciela CHICHILNISKY*

Columbia University, New York, NY 10027, USA

Received January 1979, final version received November 1979

A two good, two region and three income group macro model is constructed to explore possible effects of aid on distribution of welfare. One region, the North, has two income groups characterized by different endowments and proportions of consumption of the basic and the luxury goods. We study policies that result in transfers of goods from the *high income* group of the North to the South. In one case, the transfer is of luxury or investment goods; under the conditions, it is shown to produce a change in relative prices that induces an increase in the welfare of the North and decreases the welfare of the South, even under conditions of (Walrasian) stability of the markets. In a second case, the high income group in the North transfers, instead, basic goods to the South. It is shown that under the conditions an increase in welfare of the South can only occur at the expense of a decrease in welfare of the low income group in the North. Therefore, in general, aid in the form of commodity transfers cannot be relied upon to equalize overall welfare: under the conditions there is necessarily a trade-off between more North-South equality and greater equality within the North. When aid is endorsed to pursue NIEO objectives, a close examination of international and domestic markets seems in order, so as to avoid the conditions studied here. The formation of (international) coalitions among the different groups is also discussed.

1. Introduction

In this paper I explore two main questions. One is which welfare distribution effects are likely to occur (and under what conditions) when a transfer of commodities takes place between regions of different types of development, with different initial endowments of goods, and different patterns of consumption. The second question explored here is that of the relationship between the internal distribution of welfare within a region and the welfare effects of a transfer across regions. Instead of aggregating all income groups, two income groups are differentiated here within the giving region: they are characterized by their endowments and their particular

*This research was carried out at the Harvard Institute for International Development and the first version of the paper appeared as H.I.I.D. Development Discussion Paper no. 40 in June of 1978. This research is part of the UNITAR project on Technology, Distribution and North–South Relations. I thank Sam Cole, Ronald Findlay, Heraklis Polemarchakis, Carlos Rodriguez, Robert Mundell, Arjun Ray and Philippe de Seynes for comments and suggestions. I am especially grateful to Robert Azencott, Kelvin Lancaster, Lance Taylor and to two referees for criticisms and suggestions.

demand for different goods.[1] One of the results obtained here is that when domestic income effects within a region are considered, the welfare of the giving country may be strictly improved, and the welfare of the receiver worsened, after the transfer takes place, even under conditions of (Walrasian) stability of the market. Furthermore, under certain conditions, we show that there exists a trade-off between more domestic equality within the donor region, and more equality among the two regions.

The questions studied here are of course related to the classical transfer problem in trade theory. We shall briefly discuss the relationship with that literature.

The orthodox question in the literature on the transfer problem refers to the possibility of a secondary burden on the donor: added to the initial decrease in its endowments, the transfer may also bring about a change in the terms of trade that may worsen further the position of the donor. Implicit in this question is an assumption that the donor and the receiver are regions of similar levels of development, that can be thought of as competitors in market terms.

While the study of the transfer problem goes back at least to J. S. Mill, the classic literature on the problem received a spur from the study of the effects of post-war reparations on the economies involved. Those economies indeed could be considered 'equals'; the transfers implicit in NEIO recommendations, in contrast, occur among unequals. Our work here addresses this latter case.

The pioneering work of Leontief (1936) dealt with a possibility opposed to the orthodox question on the transfer problem, namely that of the deterioration of terms of trade for the *receiver*. In fact, he showed in a geometrical example that the change in the terms in favor of the paying country could be so great as to improve its real income after the transfer. As discussed in Mundell (1960 and 1968) and in Kemp (1969) in the standard two-region models such effects can only occur in (Walrasian) unstable markets. As we show here, however, in two-region models where two income groups are differentiated within the donor region, these effects may occur in *Walrasian stable* markets.

We construct a two-region (North and South), two-good (basic and investment/luxury goods) and three-income group (two in the North and one in the South) general equilibrium exchange model. Both the low income group in the North and the South as a whole consume proportionately more basic goods and have different initial endowments of goods, than the high income group in the North. In Theorem 1 it is assumed that the North's

[1]While income effects have always been considered important in the transfer problems, they were mostly studied at the *aggregate* country level. For instance, Jones (1975) traces the effect of a transfer on terms of trade to whether demand differences between countries are more or less pronounced than supply differences and to the sensitivity to price changes of demanders, on the one hand, and producers on the other.

high income group donates luxury/investment goods to the South from its initial endowments. Under the conditions, this is shown to decrease the welfare of the South and to increase the welfare of the North. By decreasing the relative price of the luxury/investment good, which is the most preferred by the North, even with fewer initial endowments the North is shown to be better off after the transfer. While this result is consistent in principle with Leontief's two-region geometric example [see Mundell (1960)], here we have a three-income group instead, and, furthermore, our result obtains in particular in a Walrasian stable market.[2] The South is seen to decrease its consumption of basic goods and of luxury goods at the new equilibria, and therefore, its welfare deteriorates after the transfer. In the second case, the rich in the North donate basic goods to the South, which could be thought of as a basic needs transfer policy. It is shown in Theorem 2 and Corollary 1 that an increase of the welfare of the South can only occur if there is a decrease in the welfare of the low income group of the North. Under the conditions, therefore, there is a tradeoff between more equality between the North and the South, and more equality within the North.

Some of the early empirical studies on transfer problems were actually concerned with countries at different stages of development, notably the early studies of the U.K. and Canada [Viner (1924)], the U.K. and Argentina [Williams (1920)] and the U.K. and Australia [Wilson (1931)]. However, the recent more theoretical trade literature has by and large neglected the problem posed by the different structure of development of the regions.

With respect to the question of income effects affecting terms of trade and final welfare positions of donor and receiving country, there exists at present a parallel literature to draw upon for important case studies: that of the income effects of devaluation in developing countries. This latter literature has identified income effect *between groups with one region* as an important variables in the context of exchange rate devaluation. Diaz-Alejandro (1965), Spraos (1957) and Taylor (1974) have studied this problem and they have shown, in particular, that changes in the balance and real output following a devaluation depend, in part, on the effects on income distribution within the home country of the change in exchange rates. The transfer problem relates to that of devaluation (they are, in a sense, dual — at least when monetary considerations are included) in that they both deal with relationships between the balance of payments and changes in relative prices. This was discussed some time ago, for instance, by Johnson (1956). It therefore seems plausible that income effects within one region may also affect the direction of the terms of trade and relative welfare positions of two regions following a transfer.

[2]The identification of the Leontief effect with instability was first made by Samuelson (1941, p. 29).

A final word about the transfer problem within the context of the international economic order. As the transfer problem received a spur in interest after the first world war, because of the war reparations issue, now both the issues of internal distributions and the transfer/terms of trade problems are of interest in the context of the much discussed New International Economic Order (NIEO). For instance, in much of the present NIEO discussion, transfers from the North to the South are regarded as means of obtaining more equality between the North and the South. Leontief in [Carter, Leontief and Petri (1977)] and Tinbergen (1976), refer to such transfers in the context of NIEO discussions. However, the relationship of transfers and terms of trade has been largely ignored in the NIEO literature. This is somewhat surprising, since, together with transfers, the North–South terms of trade are another quite important NIEO issue. Furthermore, within the NIEO agenda it seems worth examining the relations between internal distributions within one region on the one hand, and transfers and terms of trade on the other. Since the problem here is one of equality (it is argued that the rich should give to the poor), it is therefore appropriate to rephrase the transfer problem, as we do here, by considering two income groups in the North and studying the possible effect of transfers on the welfare of the donor and receiving regions when the high income group in the North donates commodities to the South. In the most optimistic perspective on the equalizing results of aid, the North–South transfers should draw from the resources of the rich (and not the poor) of the North. This would obtain, for instance, if the rich in the North were taxed proportionately more, and from those taxes the U.N. or the World Bank were endowed with funds to give to the South. The transfer could consist either of basic consumption goods or of investment/luxury goods.[3]

The results of this paper question the existing view on aid policy to bring about overall equalization of welfare. When transfer policies are endorsed, therefore, it seems worthwhile to examine market reactions and internal income effects to avoid the possible negative outcomes described here.

2. A general equilibrium model of a world economy

We construct here a simple general equilibrium model of a world economy with three types of agents: a high income group in the North denoted H, a low income group in the North denoted L, and the South denoted S. These groups exchange two types of goods; a basic consumption good denoted B, such as food, and a non-basic good denoted A, such as luxury or investment goods.

Each group has a welfare or utility function that measures the utility derived from the consumption of goods A and B. The utility function of H is

[3] Armaments would be another example.

denoted U, the utility function of L is denoted V, and that of S is denoted W. We assume these utility functions are of a fixed proportion type in order to emphasize income over substitution effects. Let

$$U = \min(aB, A),$$

$$V = \min(B, bA),$$

$$W = \min(B, cA).$$

Because lower income groups consume proportionately more basic goods than the higher income groups, the numbers a, b and c are larger than or equal to 1. Without loss of generality we may choose the units of measurement of A and B, respectively, so that $b=1$. (H_A, H_B) denotes the vector of initial endowments of the group H of goods A and B, and similarly (L_A, L_B) and (S_A, S_B) denote those of initial endowments of groups L and S respectively. If we assume the following condition on the endowments:

(C.1) $H_B + L_B + S_B < (1/a)H_A + L_A + cS_A$,

it follows that the equilibrium price of basic goods B cannot be zero; this can be seen as follows. To go with its H_A initial units of A, H requires at least $(1/a)H_A$ units of B, and similarly, L requires at least L_A units of B, and S requires cS_A units of B. Hence, since the right-hand side of (C.1) is larger than the total initial supply of B in the left-hand side, $p_B \neq 0$ in equilibrium. We can then normalize p_B to be identically 1, and work in the following with the relative price of A:

$$p = p_A/p_B.$$

Let x, y and z denote consumption of the basic good B by the groups H, L and S, respectively. Let $S(A)$ denote total supply of A, $S(A) = H_A + L_A + S_A$, and $S(B)$ total supply of B, $S(B) = H_B + L_B + S_B$. From utility maximization of each group subject at each price p, we obtain the following equations:

$$x + pax = H_B + pH_A, \tag{1}$$

$$y + py = L_B + pL_A, \tag{2}$$

$$z + p(z/c) = S_B + pS_A. \tag{3}$$

We add two equilibrium conditions, demand equal supply, in the market of both goods

$$x + y + z = S(B), \tag{4}$$

$$ax + y + z/c = S(A). \tag{5}$$

The eqs. (1) to (5) above have four unknowns: p, x, y, and z. However, by Walras' law only four of them are linearly independent: this is easily checked. A *general equilibrium* is a solution of the system above, a price system that clears both markets when each agent maximizes his/her utility subject to his/her budget constraint at those prices. We now assume a regularity condition on the system:

(C.2) There exists an equilibrium and, at the equilibria, a four by four subdeterminant of the Jacobian of this system is non-singular.

This condition guarantees, by the implicit function theorem, that the equilibria are locally unique and depend continuously on the parameters of the model, a form of stability of the equilibria.

3. The effects of a North–South commodity transfer

We now study the effect of a transfer on the welfare distribution among the high and low income groups in the North, and the South.

A *transfer* is a special case of a change in initial resources of the three agents. In our case, the high income group in the North gives to the South out of its initial endowments. Therefore, if the transfer is of an amount Δ of the A good, there is a change in endowments of the high income group from H_A to $H_A-\Delta$, and a corresponding change in endowments of the South, from S_A to $S_A+\Delta$. Thus, $\mathrm{d}H_A=-\mathrm{d}S_A$ along the transfer. We define the welfare of the South as the value of its utility of consumption measured by its utility function W; welfare of the North is defined to be the sum of the welfare of both high and low income groups in the North (i.e., $U+V$).

Theorem 1. Assume that the endowments of the South are small, consisting mostly of basic goods B and that conditions (C.1) and (C.2) are satisfied.

Then a transfer of the luxury or investment good A from the resources of the high income group in the North to the South will necessarily decrease the welfare of the South and increase the welfare of the North, in a (Walrasian) stable market.

The transfer produces in this case an increase in the relative price of basic goods; if, as in the example of fig. 1, at the equilibrium the South is a net importer of basic goods, the South's welfare loss derives from the relative price change.

The same result obtains, in a Walrasian unstable market, if the South's initial resources of good A exceed those of good B (in the chosen units). In this case the transfer produces a relative decrease in the price of basic goods and, if the South is a net exporter of basic goods (as in the example of fig. 2), the South's welfare loss derives from the deterioration of its terms of trade with the North.

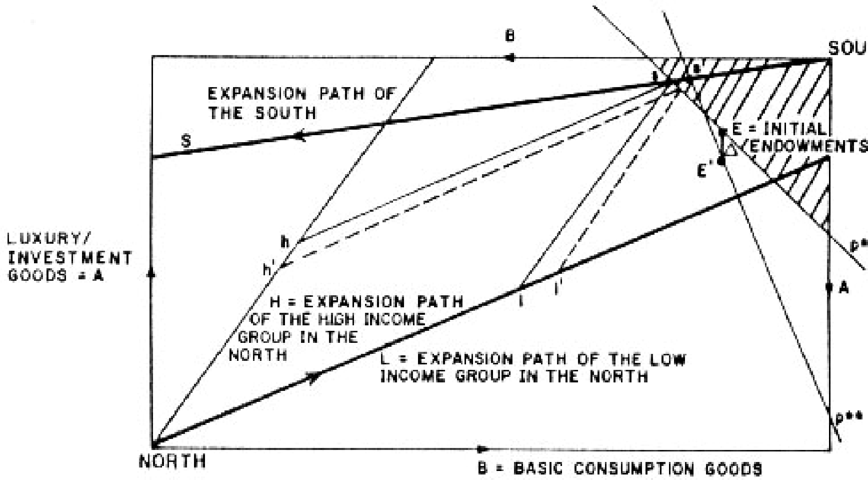

Fig. 1. This figure corresponds to the Walrasian stable case of Theorem 1: the price shift following the transfer (from p^* to p^{**}) lowers the welfare of the South as seen by the decrease in its consumption, from s to s'.

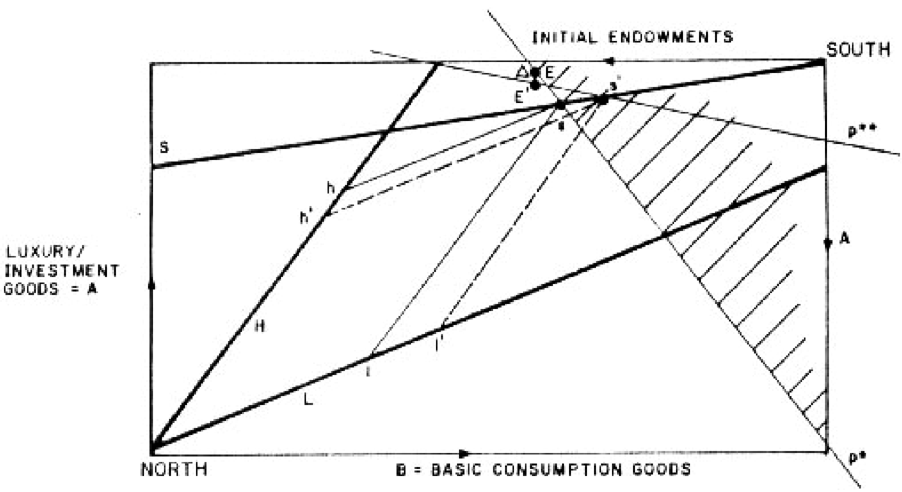

Fig. 2. This figure corresponds to the Walrasian unstable case of Theorem 1.

Before going into the proof of this theorem we shall discuss the result by means of a geometrical example which, while capturing only some of the features of the model, gives an intuitive understanding of the results. Fig. 1 is an Edgeworth box: The axes represent consumption of B and A; measured from the corner denoted S is consumption of the South, and consumption of the North is measured from the corner denoted N. Further explanation follows in the text below the figure. The H line represents the demand expansion path[4] of the high income group in the North; L and S those of the low income group in the North, and the South respectively.[5] Point E denotes initial endowments, and p^* the equilibrium price system. The shaded area represents the South's budget constraint at those prices; in order to maximize utility the South will, in equilibrium, consume at s. The North's high and low income group's consumption must in equilibrium add up together with the consumption of the South (s) to the total amount available. Since in addition the North's consumers maximize their constrained utility, they will therefore consume respectively at h and l where the price equilibrium is p^*.

We now study a transfer which displaces endowments from E to E', where the South's endowments of A have increased by an amount Δ.[6]

Assume now that at the new initial conditions the resulting price equilibrium is now p^{**}. The relative price of the basic good has increased.[7] Note that the South is now, at the new equilibrium, consuming less of both goods A and B; its welfare has decreased. The welfare of the high income group in the North decreased also, from h to h', and the welfare of the low income group in the North increases from l to l'. However, total welfare of the North has increased and that of the South has decreased. This is proven below in the proof of Theorem 1.

Fig. 1 shows that in this equilibrium the South was an importer of basic goods from the North. The change in prices induced by the transfer has increased sufficiently the relative price of the South's imports that, since the South mostly consumes basic goods, this implies a welfare loss. We show below that this first case occurs with a Walrasian stable market equilibrium.

A second case is analyzed in fig. 2. The initial endowments of the South are such that here the South is a net exporter of basic goods. After the transfer takes place the price of the basic good decreases, deteriorating the South's terms of trade sufficiently so that, again, the South's welfare

[4]These expansion curves correspond to changes in demand where either prices or income change.

[5]These curves could also be called *offer curves* in this model.

[6]Note that the picture cannot specify whose initial endowments (H or L) the transfer comes from. This is left to the proof of the theorem.

[7]The picture does not explain how this price shift comes about. This is proven in the proof of Theorem 1 below.

decreases and that of the North increases. It is shown below that this occurs with a (Walrasian) unstable market equilibrium.[8]

Proof of Theorem 1. From (1), (2) and (3) the consumption functions of the three agents in this economy, expressed in their consumption of basic goods, denoted x, y and z respectively, are

$$x = H_B + \frac{p\rho}{1+ap}, \tag{6}$$

$$y = L_B + \frac{p\lambda}{1+p}, \tag{7}$$

$$z = S_B + \frac{p\sigma}{1+p/c}, \tag{8}$$

where

$$\begin{aligned} \rho &= H_A - aH_B, \\ \lambda &= L_A - L_B, \\ \sigma &= S_A - S_{B/c}. \end{aligned} \tag{9}$$

If any of the parameters ρ, λ or σ is positive, then the corresponding group is a supplier of A and demander of B at all positive prices p; if negative, their supply/demand behavior is reversed.[9] The *excess demand function* for the good B, denoted D_B can therefore be calculated directly from (6), (7) and (8),

$$\begin{aligned} D_B &= p\left[\frac{\rho}{1+ap} + \frac{\lambda}{1+p} + \frac{\sigma}{1+p/c}\right] \\ &= \frac{\rho}{a+1/p} + \frac{\lambda}{1+1/p} + \frac{\sigma}{1/c+1/p}, \end{aligned} \tag{10}$$

therefore

$$\frac{\partial D_B}{\partial p} = \frac{\rho}{(1+ap)^2} + \frac{\lambda}{(1+p)^2} + \frac{\sigma}{(1+p/c)^2}. \tag{11}$$

[8] Note that even though in principle this latter case resembles Leontief's example, in effect, Leontief's result cannot be obtained in our model because he considers only 2 agents: in the Edgworth box diagram with 2 agents there is only one possible allocation of consumption in equilibrium, at any price, given by the interaction of the two offer curves.

[9] It can be shown that (C.1) and the initial conditions on groups H and S imply that if λ is negative, then σ must be positive. This observation was made by K. Lancaster. Because, if σ were also negative then (C.1) implies $(1/a)\rho + \lambda + c\sigma > 0$, and thus $\rho > |\lambda + \sigma/(1/c)|$. Therefore, $\rho/(a+1/p) > \lambda/(1+1/p) + \sigma/(1/c+1/p)$, which contradicts the equilibrium condition $D_B = 0$, from eq. (10).

If this derivative is positive at a price equilibrium p^*, then the equilibrium is *Walrasian stable*; if it is negative, the equilibrium is *Walrasian unstable*.

Consider now a transfer T_A of the good A from the high income group in the North to the South. Locally, at the equilibria, the total differential of p (when only H_A and S_A vary) can be expressed as

$$\mathrm{d}p = \frac{\partial p}{\partial H_A}\,\mathrm{d}H_A + \frac{\partial p}{\partial S_A}\,\mathrm{d}S_A. \tag{12}$$

However, since $\mathrm{d}H_A = -\mathrm{d}S_A$, we can rewrite (12) as

$$\mathrm{d}p = \left(\frac{\partial p}{\partial H_A} - \frac{\partial p}{\partial S_A}\right)\mathrm{d}H_A. \tag{13}$$

Hence, to trace the effect of the transfer on the price p at equilibrium, it suffices to compute the sign of $(\partial p/\partial H_A)-(\partial p/\partial S_A)$. At equilibrium, excess supply of B is zero, so that $D_B - 0$. This gives an implicit relation between p, H_A and H_B. By the implicit function theorem we obtain

$$\frac{\partial p}{\partial H_A} - \frac{\partial p}{\partial S_A} = p\frac{\left(\dfrac{1}{1+pa} - \dfrac{1}{1+p/c}\right)}{\partial D_B/\partial p}. \tag{14}$$

Since $(1+p/c)-(1+pa)=p(1/c-a)<0$, because $c>1$, it follows that the numerator of (14) is negative. Therefore, (14) is negative whenever the equilibrium is Walrasian stable (i.e., when $\partial D_B/\partial p>0$). Consequently, at Walrasian stable equilibrium, a transfer of the good A from the high income group in the North to the South decreases the relative market price of these goods. The transfer has the opposite effect on prices when the equilibrium is Walrasian unstable. The first case corresponds to fig. 1; the second to fig. 2.

It remains now to explore the change in consumption levels following the transfer at equilibrium. We shall study therefore the sign of $(\partial x/T_A)_{\bar{D}_B}$. The modified consumption equations are now

$$x = H_B + \frac{p}{1+pa}[\rho - T_A],$$

$$y = L_B + \frac{p\lambda}{1+p},$$

$$z = S_B + \frac{p}{1+p/c}[\sigma + T_A].$$

Therefore the equation of excess demand for B becomes

$$D_B = p\left[\frac{\rho + T_A}{1+pa} + \frac{\lambda}{1+p} + \frac{\sigma + T_A}{1+p/c}\right] \tag{15}$$

so that

$$\frac{\partial D_B}{\partial p} = -\frac{\rho T_A}{(1+pa)^2} + \frac{\lambda}{(1+p)^2} + \frac{\sigma + T_A}{1+p/c}, \tag{16}$$

and

$$\frac{\partial D_B}{\partial T_A} = p\left[\frac{1}{1+p/c} - \frac{1}{1+pa}\right], \tag{17}$$

which is positive if $p \neq 0$. When excess demand is held constant, i.e., along $D_B = \overline{D_B}$, it turns out from the above that

$$\left(\frac{\partial p}{\partial T_A}\right)_{\overline{D_B}} = -\frac{\partial D_B}{\partial T_A}\Big/\frac{\partial D_B}{\partial p}. \tag{18}$$

We now compute

$$\left(\frac{\partial z}{\partial T_A}\right)_{\overline{D_B}} = \frac{\partial z}{\partial T_A} + \frac{\partial z}{\partial p}\left(\frac{\partial p}{\partial T_A}\right)_{\overline{D_B}}.$$

In view of (18) above, follows that

$$\left(\frac{\partial z}{\partial T_A}\right)_{\overline{D_B}} = \left(\frac{\partial D_B}{\partial p}\cdot\frac{\partial z}{\partial T_A} - \frac{\partial z}{\partial p}\cdot\frac{\partial D_B}{\partial T_A}\right)\Big/\frac{\partial D_B}{\partial p}. \tag{19}$$

Since

$$\frac{\partial D_B}{\partial p}\cdot\frac{\partial z}{\partial T_A} - \frac{\partial z}{\partial p}\cdot\frac{\partial D_B}{\partial T_A} = \frac{-p\lambda}{(1+p/c)(1+p)}\left[\frac{1}{1+pa} - \frac{1}{1+p}\right],$$

then, when $\lambda = L_A - L_B$ is negative (as in the first part of the assumptions), it follows that at a Walrasian stable equilibrium (when $\partial D_B/\partial p > 0$) the expression (19) must be negative. Therefore, after the transfer occurs, the consumption of the South decreases and thus the sum of total consumption of the North increases at a Walrasian stable equilibrium.

When the equilibrium is Walrasian unstable ($\partial D_B/\partial_p < 0$), the same result obtains if λ is positive (see also fig. 2).

We now turn to the study of a second case, where aid takes the form of a transfer of *basic goods* from the North to the South. We obtain the following:

Theorem 2. Under conditions (C.1) and (C.2), aid in the form of a transfer of basic goods from the high income group of the North H to the South has necessarily one of the following mutually exclusive effects on welfare: either

(*a*) *The welfare of the South decreases, or*

(*b*) *The welfare of the South increases at the cost of decreasing the welfare of the low income group in the North.*

Proof. A transfer from H to S of basic goods result in a decrease of H_B and an increase of S_B by the same amount. Then, either (a) is true (i.e., z decreases) or else, if (a) is not true, under the regularity assumptions, z must increase. However, by (4) and (5)

$$x(1-a)+z(1-1/c)=S(B)-S(A). \tag{20}$$

Therefore, from (20), when z increases, x must also increase, since a and c are larger than one, and $S(B)$ and $S(A)$ are constant. Note that under the conditions the old equilibrium was *Pareto optimal*. Therefore, it follows that if at the new equilibrium x and z have increased, y must have decreased. This proves part (b). Finally, we obtain

Corollary 1. Under the assumptions of Theorem 2, if aid takes the form of a transfer of basic goods to the South from the high income group of the North, then one of the following mutually exclusive alternatives will necessarily occur: either

(*a*) *North–South welfare differentials decrease, and welfare differentials increase within the North, or*

(*b*) *North–South welfare differentials increase, and welfare differentials within the North decrease.*

Hence, there is a trade-off between more equality within the North and more equality between the North and the South under the assumptions.

Proof. We measure *welfare differentials in the North* by the difference of the welfare indicators of the North's high and low income groups, i.e., $|U-V|$. We measure *welfare differentials between the North and the South* by the difference of the sum of the welfare indicators of both high and low income groups within the North, and the welfare indicator for the South, i.e., $|U+V-W|$. Then, if case (b) of Theorem 2 occurs, W increases and V decreases. By (4) and (5)

$$S(B)-cS(A)=x(1-ac)+y(1-c).$$

Since $c>1$ and $a \cdot c>1$, it follows that when V decreases (which implies that y decreases) x, and hence U, must increase. Therefore, in case (b) of Theorem 2 $|U-V|$ will increase; this proves that welfare differentials within the North have increased. Also, by (4), since z has increased, $x+y$ will decrease, which implies $|U+V|$ decreases. Therefore, the North–South welfare differentials have decreased in this case.

In case (a) of Theorem 2, W decreases. This implies, by (20), that x and U decrease also. Hence, by (4) y, and thus V, must increase. Therefore, $|U-V|$ decreases. Also, by (4), since W decreases, $|U+V|$ must increase. This implies that $|U+V-W|$ will increase in this case. Since cases (a) and (b) of Theorem 2 cover all possibilities, we have proven the Corollary.

4. Transfers, welfare and coalitions

In figs. 1 and 2, the welfare changes of the high income group in the North and the South due to a transfer are both of the same direction. It is easy to see that this derives from the assumptions on their preferences: from

$$U=\min(aB, A),$$

$$V=\min(B, bA),$$

$$W=\min(B, cA),$$

and the market clearing conditions

$$x+y+z=S(B),$$

$$ax+y/b+z/c=S(A),$$

we obtain

$$x(1-ba)+z(1-b/c)=S(B)-bS(A)=\text{constant}.$$

Since $1-ba<0$ and $1-b/c>0$, it follows that $\mathrm{d}x/\mathrm{d}z>0$. However, if $b>c$, i.e., if the low income group in the North is chosen so that its preferences imply a demand with a higher proportion of basic goods than that of the aggregated demand of the South, the result is reversed: the effect of a transfer from the high income group in the North to the South is the opposite on the welfare of these two groups. Fig. 3 shows how the welfare effect of the transfer takes place.

The results of Theorem 1 above along with the discussion of the preceeding paragraph tell us what would be an optimal *choice of coalition*

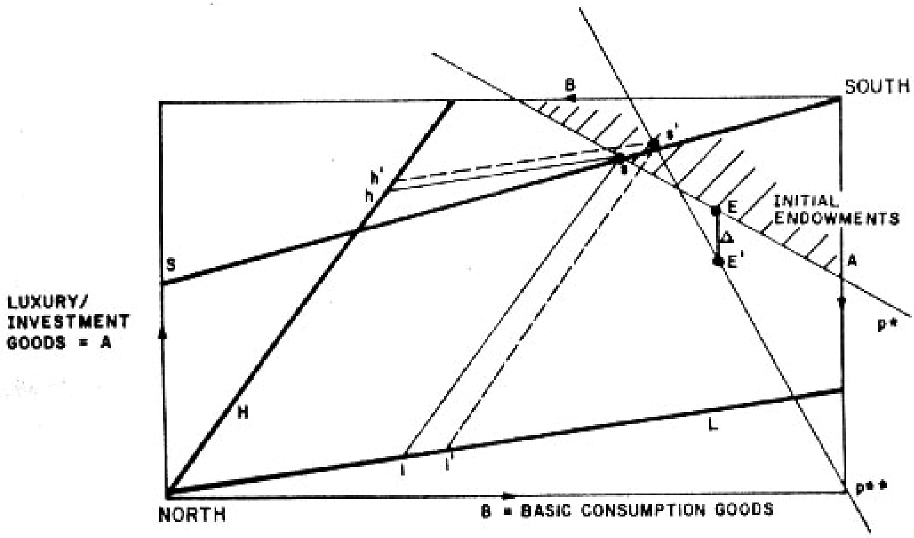

Fig. 3

among unequals when a transfer is concerned. If a transfer is to be made, it is optimal for the donor to give to the group to which it is most unequal. In the case that $b<c$ (figs. 1 and 2) the most unequal group is the South; in the case that $b>c$ (as in fig. 3) the most unequal group is that of the poor in the North.[10]

5. Summary and conclusions

Possible effects of economic aid on the terms of trade and the distribution of wealth are studied in the context of a pure exchange, general equilibrium model of a world economy. Three groups of agents are considered: high and low income groups in the North and a group in the South. Each group has a welfare or utility function based on its consumption of two types of goods — basic goods (such as food) and non-basic goods (such as luxury goods, capital goods, armaments, etc.). The high income group consumes proportionately less basic goods than the lower income group in the North and both groups in the North consume proportionately less basic goods than the South. Effects on welfare of aid policies resulting in transfers from initial endowments of the high income group in the North to the South are

[10]Gale (1974) works out a numerical example of a related but different phenomenon: Two agents are both able to increase their welfare at the cost of the welfare of the third by means of a re-allocation of their endowments; here, instead, one group in the North (high income), by making a transfer to the South can improve the overall welfare of the North and worsen that of the South; the improvement in the welfare of the North may occur here both with a worsening and with an improvement in the welfare of the donor group, as seen in sections 3 and 4, respectively.

explored. Both the low income group of the North and the South have small initial endowments of the luxury or investment good. It is shown that the transfers may change the terms of trade in such a way that in a new world market equilibrium the North is strictly better off and the South worse off than before in terms of welfare (real wealth). Furthermore, in certain cases when aid from the North *does* improve the welfare of the South, the welfare of the South is related to that of the low income groups in the North in such a way that only two mutually exclusive effects of aid may occur: either (1) welfare differentials increase within the North's high and low income groups, or (2) welfare differentials increase between the North and the South. Hence, under the conditions of the world's economy studied here, aid policies cannot be expected to help to equalize welfare globally. The formation of coalitions among the groups is discussed.

The results indicate the need for a more careful analysis of effects of aid policy. Partial equilibrium analysis cannot be expected to give a full picture of the possible effects of aid. In a general equilibrium framework, aid, the terms of trade, and the distribution of welfare turn out to be related in somewhat complex ways. In some cases aid policies may turn out to be inadequate and more inward looking economic policies may be required within the South if both improvements of welfare in each region and equalization of North South welfare are desired.

References

Carter, A., W. Leontief and P. Petri, 1977, The future of the world economy (Oxford University Press, Oxford).

Chipman, J.S., 1974, The transfer problem once again, in: G. Horwich and P.A. Samuelson, eds., Trade stability and macroeconomics (Academic Press, New York).

Diaz-Alejandro, C., 1965, Exchange rate devaluation in a semi-industrialized country: The experience of Argentina 1955–61 (MIT Press, Cambridge, MA).

Gale, D., 1974, Exchange equilibrium and coalitions, Journal of Mathematical Economics.

Johnson, H., 1956, The transfer problem and exchange stability, Journal of Political Economy, June.

Jones, R.W., 1975, Presumption and the transfer problem, Journal of International Economics.

Kemp, M.C., 1969, The pure theory of international trade and investment (Prentice-Hall, Englewood Cliffs, NJ).

Leontief, W., 1936, A note on the pure theory of transfer, Explorations in Economics (New York).

Mundell, R.A., 1960, The pure theory of international trade, American Economic Review.

Mundell, R.A., 1968, International economics (McMillan, New York).

Samuelson, P.A., 1941, The stability of equilibria: Comparative statics and dynamics, Econometrica.

Spraos, J., 1957, Stability in a closed economy and in the foreign exchange market and the redistributive effect of price changes, Review of Economic Studies, June.

Taylor, L., 1974, Short-term policy in open semi-industrialized economies: The narrow limits of the possible, Journal of Development Economics.

Tinbergen, J., ed., 1976, RIO reshaping the international order (Dutton, New York).

Viner, J., 1924, Canada's balance of international indebtedness 1900–1930 (Harvard University Press, Cambridge, MA).

Williams, J.H., 1920, Argentine international trade under unconvertible paper money 1880–1900 (Harvard University Press, Cambridge, MA).

Wilson, R., 1931, Capital imports and the terms of trade (Melbourne).