INTERNATIONAL TRANSFERS

IN TWO- AND THREE-NATION DYNAMIC MODELS

TAN Kim Heng

Nanyang Business School

Nanyang Technological University

SINGAPORE 639798

and

A.D. WOODLAND

Department of Econometrics

The University of Sydney

N.S.W. 2006

AUSTRALIA

June 1996

Abstract

It is well known that international transfers impoverish the donor and enrich the recipient in a stable distortion-free two-nation world and that incorporating a third nation may lead to paradoxical results. These results have been obtained using static models. More recently, economists have studied international transfers using dynamic models. However, their analyses are confined to a two-nation world. Although it is well known that incorporating a third nation in static models may lead to paradoxical results, it is not at all clear how adding a third nation in dynamic models would affect welfare results. The objective of this paper is to investigate this issue.

JEL Classification: F35

1. Introduction

It is well known that international transfers impoverish the donor and enrich the recipient in a two-nation world with stable markets and with no distortions. See, e.g., Samuelson (1947, p.29) and Kemp and Abe (1994). It is also well known that the incorporation of a distortion or a third nation (agent) may lead to paradoxical results. See, e.g., Bhagwati, Brecher and Hatta (1983, 1984, 1985), Brecher and Bhagwati (1982), Dixit (1983), Gale (1974), Kemp and Kojima (1985), Leonard and Manning (1983), Ohyama (1974), Turunen-Red & Woodland (1988) and Yano (1983). All these authors studied international transfers using static models. More recently, Galor & Polemarchakis (1987) and Haaparanta (1989) studied international transfers using dynamic models. However, their analyses are confined to a two-nation world. Although it is well known that the incorporation of a third nation in static models may lead to paradoxical results, it is not at all clear how the incorporation of a third nation in dynamic models would affect the welfare results. The objective of this paper is to investigate this issue.

To achieve the objective of the paper, we extend the two-nation overlapping generations (OLG) model of Galor & Polemarchakis (1987) on international transfers to include a third nation. We study exhaustively the long-run welfare implications of international transfers in a three-nation world, and compare the welfare results with those in a two-nation world. We follow Galor & Polemarchakis in focusing on the long run by ignoring the distribution of welfare gains or losses on the transition path from one equilibrium to another.[1]

The organization of the rest of the paper is as follows. In Section 2, an OLG model is formulated to study the long-run welfare implications of international transfers. Section 3 discusses the welfare results in the context of a two-nation world economy. Section 4 relaxes the two-nation assumption, and extends the analysis to incorporate a third nation. Section 5 contains concluding remarks.

2. Model Formulation

The model used is an extension of the two-nation OLG model of Galor & Polemarchakis (1987) on international transfers to include a third nation.[2] The three nations are indexed by j = D,R,B.[3] The index j is suppressed from Sections 2.1-2.4 for convenience.

2.1. Consumers

Consumers live for two periods and form overlapping generations of constant size. In the first period, they supply one unit of labor each and earn a post-tax wage rate $\omega \equiv w - \tau$, where w is the pre-tax wage rate and τ the labor income tax. They consume c_1 and save s each, governed by $c_1 + s \leq \omega$. They save by purchasing capital, which is rented to producers and earns an interest rate of r. In the second period, they retire and consume c_2 each, governed by $c_2 \leq (1+r)s$.

Preferences of consumers within each nation are represented by a utility function $u(c) \equiv u(c_1,c_2)$. u(c) defined for $c \geq 0$ is continuous, strictly quasi-concave and increasing.

Define an indirect utility function as :

$$v(r,\omega) \equiv \max_c \{u(c): c_1 + (1+r)^{-1}c_2 \leq \omega;\ c \geq 0\} \text{ for } ((1+r)^{-1},\omega) >> 0. \qquad (1)$$

$v(r,\omega)$ is assumed to be twice differentiable. Under the monotonicity assumption of the utility function, it is well known that the derivatives of $v(r,\omega)$ satisfy $v_r > 0$, $v_\omega > 0$.

Under the consumer regularity condition assumed, consumption and saving are uniquely determined: $c = c(r,\omega)$ and $s = s(r,\omega)$. Applying Roy's Identity to the saving function yields

$$(1+r)^{-1}s = v_r/v_\omega. \tag{2}$$

Assuming that c_1 satisfies the normality assumption, $0 < c_{1\omega} < 1$, we have $0 < s_\omega < 1$. It is well known that the signs of the interest rate derivatives of $c(r,\omega)$ and $s(r,\omega)$ are ambiguous.

2.2. Producers

Producers produce a single good using labor and capital. On a per-capita basis, they rent k units of capital, hire one unit of labor and sell y units of output in each period. Production is subject to constant returns to scale. The per-capita production function $f(k)$ is bounded, continuous, strictly concave and increasing.

Define a unit-labor pre-wage profit function as in Tan (1995a):[4]

$$\pi(r) \equiv \max_{(y,k)} \{y - rk: f(k) \geq y; (y,k) \geq 0\} \text{ for } r > 0. \tag{3}$$

$\pi(r)$ is assumed to be twice differentiable.

Under constant returns to scale, profits are assumed to be zero. Hence, the wage rate is:

$$w = \pi(r). \qquad (4)$$

By Hotelling's (1932) Lemma, the per-capita demand for capital is

$$k = - \pi_r(r). \qquad (5)$$

Under the monotonicity assumption of the production function, it is well known that $k_r < 0$.

2.3. Government

Each government collects tax revenue of τ per capita from labor income and spends on international transfers of t per capita. Hence, the per-capita government budget constraint is:

$$\tau = t. \qquad (6)$$

2.4. External Sector

Define a national excess supply of savings function for each nation as:[5]

$$\alpha(r;t) \equiv s(r,\omega(r;t)) - k(r). \qquad (7)$$

Differentiating (7) and using (4), (5), and (6) yields:

$$\alpha_r \equiv s_r - k_r - s_\omega k,$$

$$\alpha_t \equiv - s_\omega. \qquad (8)$$

The sign of α_r is summarized in:

Lemma 1: Assume that consumption is normal, the world capital market is locally Walrasian stable at a temporary equilibrium, and the steady state equilibrium is locally dynamically stable. Then $\Sigma_j \alpha_r^j > 0$.[6]

2.5. The Model

The model comprises the following equations:

$$\Sigma_j \alpha^j(r;t^j) = 0, \tag{9}$$

$$\Sigma_j t^j = 0, \tag{10}$$

$$v^j = v^j(r,\omega^j(r;t^j)), \quad j = D,R,B. \tag{11}$$

Equation (9) is the world capital market equilibrium condition. (10) forces the international transfers to sum to zero. (11) determines the welfare of each nation.

Given the differentiability assumptions stipulated, the model comprising equations (9)-(11) can be differentiated at the initial equilibrium, assuming an equilibrium exists, to yield:[7]

$$\Sigma_j \alpha_r^j dr = - \Sigma_j \alpha_t^j dt^j, \tag{12}$$

$$\Sigma_j dt^j = 0, \tag{13}$$

$$dv^j = [(1+r)^{-1}s^j - k^j]v_\omega^j dr - v_\omega^j dt^j, \quad j = D,R,B. \tag{14}$$

Using (12) to eliminate dr from (14) yields

$$dv^j = -[(1+r)^{-1}s^j - k^j]v_\omega^j(\Sigma_j\alpha_r^j)^{-1}(\Sigma_j\alpha_t^j dt^j) - v_\omega^j dt^j, \quad j = D,R,B. \qquad (14')$$

The problem here is to determine the conditions underlying all possible results to (14') such that (13) holds.

3. Two-Nation World

3.1. Results

We begin by considering a two-nation world economy. The long-run welfare results of international transfers in a two-nation world are summarized by:

Theorem 1: Let nation D with $\alpha_t^D > \alpha_t^R$ increase its international transfer to nation R by a small amount $dt^D = -dt^R > 0$. Subject to the assumptions of the model,

(a) $dv^D > 0$, $dv^D > 0$ if, and only if, $\alpha^D < \underline{a}$, $\alpha^R < \bar{\bar{a}}$;

(b) $dv^D > 0$, $dv^R < 0$ if, and only if, $\alpha^D < \underline{a}$, $\alpha^R > \bar{\bar{a}}$;

(c) $dv^D < 0$, $dv^R > 0$ if, and only if, $\alpha^D > \underline{a}$, $\alpha^R < \bar{\bar{a}}$; and

(d) $dv^D < 0$, $dv^R < 0$ does not exist,

where

$\underline{a} \equiv r(v_r^D/v_\omega^D) - \Sigma_j\alpha_r^j(\alpha_t^D - \alpha_t^R)^{-1}$,

$\bar{\bar{a}} \equiv r(v_r^R/v_\omega^R) + \Sigma_j\alpha_r^j(\alpha_t^D - \alpha_t^R)^{-1}$.

Proof: For a 2-nation world, discard B. Use (7) to eliminate k^j from (14'), and use (2) and (13) to yield the change in welfare for each of nations D and R:

$$dv^D = \{[r(v_r^D/v_\omega^D) - \alpha^D](\Sigma_j\alpha_r^j)^{-1}(\alpha_t^D-\alpha_t^R)^{-1} - 1\}v_\omega^D dt^D, \quad (14'a)$$

$$dv^R = \{[r(v_r^R/v_\omega^R) - \alpha^R](\Sigma_j\alpha_r^j)^{-1}(\alpha_t^D-\alpha_t^R)^{-1} + 1\}v_\omega^R dt^D. \quad (14'b)$$

Make use of the relevant signs established above to yield the desired results. Q.E.D.

Theorem 2: Let nation D with $\alpha_t^D < \alpha_t^R$ increase its international transfer to nation R by a small amount $dt^D = - dt^R > 0$. Subject to the assumptions of the model,

(a) $dv^D > 0$, $dv^R > 0$ does not exist;

(b) $dv^D > 0$, $dv^R < 0$ if, and only if, $\alpha^D > \underline{a}$, $\alpha^R < \overline{\overline{a}}$;

(c) $dv^D < 0$, $dv^R > 0$ if, and only if, $\alpha^D < \underline{a}$, $\alpha^R > \overline{\overline{a}}$; and

(d) $dv^D < 0$, $dv^R < 0$ if, and only if, $\alpha^D < \underline{a}$, $\alpha^R < \overline{\overline{a}}$,

where $\underline{a}$ and $\overline{\overline{a}}$ are as defined in Theorem 1.

Proof: Similar to the proof of Theorem 1. Q.E.D.

Our two-nation OLG model resulting in Theorems 1 and 2 differ from the two-nation OLG model of Galor and Polemarchakis (1987) in two respects:

1. We consider the set of all possible welfare results whereas Galor and Polemarchakis focus on Pareto-improving and donor-enriching recipient-impoverishing international transfers. In considering the set of all possible welfare results, we uncover an interesting set of results: an international transfer can never be strict Pareto immiserizing but can be strict Pareto improving when the donor's saving propensity is less than the recipient's; on the other hand, it can be strict Pareto immiserizing but can never be strict Pareto improving when the donor's saving propensity is greater than the recipient's.[8] Thus, our study

includes strict Pareto-immiserizing transfers, which Galor and Polemarchakis do not study and which have been scarcely treated in the literature.[9]

2. Galor and Polemarchakis characterize the conditions underlying their welfare results in terms of differences in saving propensities and bounds on technological requirements. On the other hand, we characterize the conditions underlying the welfare results in terms of differences in saving propensities and bounds on external assets, a characterization that is more natural once we explain the welfare effects of the transfer.

Haaparanta (1988), also using a two-nation OLG model, shows that an international transfer financed by public debt in the donor nation, assumed to be a creditor nation with the higher saving propensity, and disposed of as a relief to public debt in the recipient nation leads to ambiguous welfare results in the long run. This aspect of Haaparanta's work is directly comparable to Theorem 2 since this international transfer is equivalent to the transfer in the theorem.[10] The theorem shows, however, that unambiguous results can be obtained depending upon the level of per-capita external assets and that a strict Pareto-improving transfer does not exist. These results are not apparent from Haaparanta's work.

In a Pareto-efficient equilibrium, paradoxical results such as Pareto-inferior (or superior) transfers are impossible. Clearly, our paper is dealing, not with Pareto-efficient equilibria but, with a ‘second-best’ equilibrium, in which distortions are present. There is, then, a presumption that anything is possible in a ‘second-best’ equilibrium. Yet, we also show that certain results are impossible: strict Pareto-immiserizing transfers in Theorem 1 and strict Pareto-improving transfers in Theorem 2. We turn now to an explanation of the welfare results.

3.2. Explanation of Results

To see the welfare effects of the international transfer, use equations (2) and (7) in conjunction with (14) to derive

$$dv^D = - rv_r^D dr + \alpha^D v_\omega^D dr - v_\omega^D dt^D,$$

$$dv^R = - rv_r^R dr + \alpha^R v_\omega^R dr + v_\omega^R dt^D. \quad (14'')$$

The first term on the right hand side of each equation in (14") represents the intertemporal efficiency effect on welfare, reflecting each nation's move relative to the golden rule of capital accumulation.[11] Now, the increase in international transfer changes world savings and the interest rate, moving both nations relative to the golden rule. The intertemporal efficiency effect is favorable or adverse depending upon whether the donor's saving propensity is less or greater than the recipient's. The second term represents the external asset income effect on each nation's welfare, and is favorable or adverse according as the nation is a debtor or creditor nation when the interest rate decreases.[12] The third term represents the income effect due directly to the change in international transfer. This effect is adverse for nation D, which has to increase its labor income tax to finance the increase in its transfer abroad, and favorable for nation R, which receives the transfer. The sum of the three effects determines the net welfare change for each nation.

A necessary condition for paradoxical results is the existence of international differences in saving propensities. With international differences in saving propensities, international transfers will change world savings and the interest rate and, hence, will affect intertemporal efficiency. Thus the distortion that gives rise to paradoxical results is the gap between the pre-existing capital-labor ratio and the golden rule value for each nation.

However, even if there are international differences in saving propensities, certain paradoxical results cannot arise. In Theorem 1, the international transfer can never be strict Pareto immiserizing because the transfer from nation D, which has the smaller saving propensity, to nation R, which has the larger saving propensity, will increase world savings and intertemporal efficiency for both nations. In Theorem 2, the international transfer can never be strict Pareto improving because the transfer from nation D, which now has a larger saving propensity, will decrease world savings and intertemporal efficiency for both nations.[13]

4. Three-Nation World

We now extend the two-nation OLG model of Galor and Polemarchakis (1987) to include a third nation. The long-run welfare results of international transfers in a three-nation world are summarized by:

Theorem 3: Let nation D with $\alpha_t^D > \alpha_t^R$ increase its international transfer to nation R by a small amount $dt^D = - dt^R > 0$ in the presence of nation B. Subject to the assumptions of the model,

(a) $dv^D > 0$, $dv^R > 0$, $dv^B > 0$ if, and only if, $\alpha^D < \underline{a}$, $\alpha^R < \bar{\bar{a}}$, $\alpha^B < \bar{a}$;

(b) $dv^D > 0$, $dv^R > 0$, $dv^B < 0$ if, and only if, $\alpha^D < \underline{a}$, $\alpha^R < \bar{\bar{a}}$, $\alpha^B > \bar{a}$;

(c) $dv^D > 0$, $dv^R < 0$, $dv^B > 0$ if, and only if, $\alpha^D < \underline{a}$, $\alpha^R > \bar{\bar{a}}$, $\alpha^B < \bar{a}$;

(d) $dv^D > 0$, $dv^R < 0$, $dv^B < 0$ if, and only if, $\alpha^D < \underline{a}$, $\alpha^R > \bar{\bar{a}}$, $\alpha^B > \bar{a}$;

(e) $dv^D < 0$, $dv^R > 0$, $dv^B > 0$ if, and only if, $\alpha^D > \underline{a}$, $\alpha^R < \bar{\bar{a}}$, $\alpha^B < \bar{a}$;

(f) $dv^D < 0$, $dv^R > 0$, $dv^B < 0$ if, and only if, $\alpha^D > \underline{a}$, $\alpha^R < \bar{\bar{a}}$, $\alpha^B > \bar{a}$;

(g) $dv^D < 0$, $dv^R < 0$, $dv^B > 0$ if, and only if, $\alpha^D > \underline{a}$, $\alpha^R > \bar{\bar{a}}$, $\alpha^B < \bar{a}$;

(h) $dv^D < 0$, $dv^R < 0$, $dv^B < 0$ does not exist,

where $\underline{a}$ and $\bar{\bar{a}}$ are as defined in Theorem 1, and $\bar{a} \equiv r(v_r^B/v_\omega^B)$.

Proof: Follows the proof of Theorem 1. In place of equations (14'a) and (14'b) in Theorem 1, we have

$$dv^D = \{[r(v_r^D/v_\omega^D) - \alpha^D](\Sigma_j\alpha_r^j)^{-1}(\alpha_t^D-\alpha_t^R)^{-1} - 1\}v_\omega^D dt^D, \tag{14'a}$$

$$dv^R = \{[r(v_r^R/v_\omega^R) - \alpha^R](\Sigma_j\alpha_r^j)^{-1}(\alpha_t^D-\alpha_t^R)^{-1} + 1\}v_\omega^R dt^D, \tag{14'b}$$

$$dv^B = [r(v_r^B/v_\omega^B) - \alpha^B](\Sigma_j\alpha_r^j)^{-1}(\alpha_t^D-\alpha_t^R)^{-1}v_\omega^B dt^D. \qquad (14'b)$$

Q.E.D.

Theorem 4: Let nation D with $\alpha_t^D < \alpha_t^R$ increase its international transfer to nation R by a small amount $dt^D = -dt^R > 0$ in the presence of nation B. Subject to the assumptions of the model,

(a) $dv^D > 0$, $dv^R > 0$, $dv^B > 0$ does not exist;

(b) $dv^D > 0$, $dv^R > 0$, $dv^B < 0$ if, and only if, $\alpha^D > \underline{a}$, $\alpha^R > \bar{\bar{a}}$, $\alpha^B < \bar{a}$;

(c) $dv^D > 0$, $dv^R < 0$, $dv^B > 0$ if, and only if, $\alpha^D > \underline{a}$, $\alpha^R < \bar{\bar{a}}$, $\alpha^B > \bar{a}$;

(d) $dv^D > 0$, $dv^R < 0$, $dv^B < 0$ if, and only if, $\alpha^D > \underline{a}$, $\alpha^R < \bar{\bar{a}}$, $\alpha^B < \bar{a}$;

(e) $dv^D < 0$, $dv^R > 0$, $dv^B > 0$ if, and only if, $\alpha^D < \underline{a}$, $\alpha^R > \bar{\bar{a}}$, $\alpha^B > \bar{a}$;

(f) $dv^D < 0$, $dv^R > 0$, $dv^B < 0$ if, and only if, $\alpha^D < \underline{a}$, $\alpha^R > \bar{\bar{a}}$, $\alpha^B < \bar{a}$;

(g) $dv^D < 0$, $dv^R < 0$, $dv^B > 0$ if, and only if, $\alpha^D < \underline{a}$, $\alpha^R < \bar{\bar{a}}$, $\alpha^B > \bar{a}$;

(h) $dv^D < 0$, $dv^R < 0$, $dv^B < 0$ if, and only if, $\alpha^D < \underline{a}$, $\alpha^R < \bar{\bar{a}}$, $\alpha^B < \bar{a}$;

where $\underline{a}$, $\bar{a}$ and $\bar{\bar{a}}$ are as defined in Theorem 3.

Proof: Similar to the proof of Theorem 3. Q.E.D.

Theorems 3 and 4 show the rich diversity of long-run welfare results that can be extracted from international transfers in a three-nation dynamic model. It appears that there are no similar studies in the existing literature using three-nation dynamic models of international transfers, although Yano (1983) has investigated exhaustively the welfare implications of international transfers, and Kemp and Kojima (1987) the welfare effects of direct and indirect aid, in three-nation static models.

How does the incorporation of a third nation affect the longrun welfare results of international transfers in a two-nation world? A comparison of Theorem 1 against Theorem 3 and Theorem 2 against Theorem 4 provides most of the answers.

Comparing Theorems 1 and 3, we find that, when the donor's saving propensity is less than the recipient's, the results that an international transfer can enrich both the donor and recipient, or impoverish the donor and enrich the recipient, or enrich the donor and impoverish the recipient, are not altered by the incorporation of a third nation. This is unlike the trade literature, where the addition of a third nation overturns the basic proposition that international transfers in a two-nation world with stable markets and no distortions impoverish the donor and enrich the recipient. However, the result that an international transfer will never impoverish both the donor and recipient is altered by the addition of a third nation. In the presence of a third nation, an international transfer can impoverish both the donor and recipient provided the third nation is enriched.

In Section 3.1 we show that the results, that an international transfer can never be strict Pareto improving but can be strict Pareto immiserizing when the donor's saving propensity is greater than the recipient's, are reversed when the donor's saving propensity is less than the recipient's. These results are not altered by the addition of a third nation, as can be observed from Theorems 3 and 4.

Comparing Theorems 2 and 4, we find that, when the donor’s saving propensity is greater than the recipient’s, the results that an international transfer can impoverish the donor and enrich the recipient, or enrich the donor and impoverish the recipient, or impoverish both the donor and recipient, are not altered by the incorporation of a third nation. However, the result that an international transfer will never enrich both the donor and recipient is altered by the addition of a third nation. An international transfer can enrich both the donor and recipient provided the third nation is impoverished.

5. Concluding Remarks

This paper adds several new welfare results to the theoretical literature on international transfers.

First, an international transfer can never be strict Pareto immiserizing but can be strict Pareto improving when the donor's saving propensity is less than the recipient's. On the other hand, it can never be strict Pareto improving but can be strict Pareto immiserizing when the donor's saving propensity is greater than the recipient's. This set of results is unaltered by the incorporation of a third nation. These Pareto-inferior/superior transfers do not exist despite the presence of a distortion in the form of a gap between the pre-existing capital-labor ratio and the golden-rule value for each nation. We know that such transfers cannot exist in Pareto-efficient equilibria and, therefore, there is a presumption that such transfers can exist in non-Pareto efficient equilibria, but this presumption turns out to be wrong.

Second, the results that an international transfer can impoverish the donor and enrich the recipient or enrich the donor and impoverish the recipient, irrespective of whether the donor's saving propensity is greater or less than the recipient's, are not altered by the addition of a third nation. This is unlike the trade literature, where the addition of a third nation overturns the basic proposition that international transfers in a stable distortion-free two-nation world impoverish the donor and enrich the recipient.

Third, when the donor's saving propensity is less than the recipient's, the result that an international transfer can enrich both the donor and recipient is not altered by the addition of a third nation. However, the result that an international transfer will never impoverish both the donor and recipient is altered by the addition of a third nation: an international transfer can impoverish both the donor and recipient provided the third nation is enriched.

Fourth, when the donor's saving propensity is greater than the recipient's, the result that an international transfer can impoverish both the donor and recipient is not altered by the addition of a third nation. However, the result that an international transfer will never enrich both the donor and recipient is altered by the addition of a third nation: an international transfer can enrich both the donor and recipient provided the third nation is impoverished.

Notes

1 Galor & Polemarchakis (1987) cite the tradition of the literature on the transfer paradox in ignoring the distribution of welfare gains or losses on the transition path from one equilibrium to another.

2 The OLG model is due to Samuelson (1958) and Diamond (1965).

3 D, R and B stand for donor, recipient and bystander, respectively.

4 The model here adopts a fully-dual approach as opposed to the semi-dual approach of Galor & Polemarchakis (1987). Using a fully-dual approach leads to algebraic expressions that are easy to interpret and stability conditions that have very natural interpretations.

5 $\alpha(r;t)$ embodies utility maximization, profit maximization and compliance of the government budget constraint.

6 See Tan (1995b) for a proof. Because the model here adopts a fully-dual approach, the stability condition has a natural interpretation: $\Sigma_j\alpha_r^j > 0$ merely says that the world excess supply of savings function is positively sloped at the steady-state equilibrium. Compare this with the stability condition in Galor & Polemarchakis (1987).

7 In deriving (14), equations (2), (4), (5) and (6) are used.

8 $\alpha_t^D > \alpha_t^R$ means that the donor's saving propensity is less than the recipient's saving propensity. See the identity for α_t in (8).

9 Haaparanta (1989) shows that an international transfer financed by lump-sum labor-income taxes in the donor nation and disposed of as a public-debt relief in the recipient nation can immiserize both nations in the short run. We have been able to show that strict Pareto- immiserizing long-run transfers exist without relying on public debt.

10 See Haaparanta (1989, p.379).

11 See Phelps (1961, 1965).

12 Collectively, the first two terms represent the intertemporal terms of trade effect on welfare.

13 The other two welfare effects are diametrically opposed for the two nations.

References

Bhagwati, J.N., R.A. Brecher and T. Hatta (1983), "The generalized theory of transfers and welfare: Bilateral transfers in a multilateral world," *American Economic Review* 73, 606-618

Bhagwati, J.N., R.A. Brecher and T. Hatta (1984), "The paradoxes of immiserizing growth and donor-enriching 'recipient-immiserizing' transfers: a tale of two literatures," *Welwirtschaftliches Archiv* 120, 228-243

Bhagwati, J.N., R.A. Brecher and T. Hatta (1985), "The generalized theory of transfers and welfare: exogenous (policy-imposed) and endogenous (transfer-induced) distortions," *Quarterly Journal of Economics* 100, 697-714

Brecher, R.A. and J.N. Bhagwati (1982), "Immiserizing transfers from abroad," *Journal of International Economics* 13, 353-364

Diamond, P.A. (1965), "National debt in a neoclassical growth model," *American Economic Review* 55, 1126-1150

Dixit, A., (1983), "The multi-country transfer problem," *Economics Letters* 13, 49-53

Gale, D. (1974), "Exchange Equilibrium and Coalitions: An Example," *Journal of Mathematical Economics* 1, 63-66

Galor, O. and H.M. Polemarchakis (1987), "Intertemporal equilibrium and the transfer paradox," *Review of Economic Studies* 54, 147-156

Haaparanta, P. (1989), "The intertemporal effects of international transfers," *Journal of International Economics* 26, 371-382

Hotelling, H. (1932), "Edgeworth taxation paradox and the nature of demand and supply functions," *Journal of Political Economy* 40, 577-616

Kemp, M.C. and K. Abe (1994), "The transfer problem in the context of public goods," *Economics Letters* 45, 223-226

Kemp, M.C., and S. Kojima (1985), "Tied aid and the paradoxes of donor-enrichment and recipient-impoverishment," *International Economic Review* 26, 721-729

Kemp, M.C., and S. Kojima (1987), "More on the welfare economics of foreign aid," *Journal of Japan and International Economies* 1, 1-13

Leonard, D. and R. Manning (1983), "Advantageous Reallocations: A Constructive Example," *Journal of International Economics* 15, 291-295

Ohyama, M. (1974), "Tariffs and the Transfer Problem," *Keio Economic Studies* 9, 37-73

Phelps, E.S. (1961), "The golden rule of accumulation," *American Economic Review* 51, 638-643

Phelps, E.S. (1965), "Second Essay on the Golden Rule of Accumulation," *American Economic Review* 55, 793-814

Samuelson, P.A. (1947), *Foundations of Economic Analysis*, Harvard University Press, Cambridge, Massachusetts

Samuelson, P.A. (1958), "An exact consumption-loan model of interest with or without the social contrivance of money," *Journal of Political Economy* 66, 467-482

Tan, K.H. (1995a), "The Intergenerational Incidence of Government Spending," *Economic Record* 71, 54-65

Tan, K.H. (1995b), "Strictly Pareto-Improving Bilateral Reforms of Public Debts," *Journal of Economics* 62, 141-156

Turunen-Red, A. and A. D. Woodland (1988), "On the multilateral transfer problem: existence of Pareto improving international transfers," *Journal of International Economics* 25, 249-269

Yano, M. (1983), "Welfare aspects of the transfer problem," *Journal of International Economics* 15, 277-289