

**THE POSSIBILITY OF RECIPIENT-HARMING,  
DONOR-BENEFITING TRANSFERS WITH MORE  
THAN TWO COUNTRIES**

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The possibility of a commodity transfer among nations which simultaneously benefits the donor and harms the recipient is examined. An example of a three-country exchange economy is presented where a transfer may be made which gives the counter-intuitive result. The result is then explained.

### **1. Introduction**

The effects of an intercountry transfer of purchasing power were first prominently discussed by Keynes (1929) and Ohlin (1929) in a debate concerning the secondary effects of such a transfer. In subsequent years several economists, including Pigou (1932), Metzler (1942), Samuelson (1952, 1954) and Johnson (1955), joined the debate. Throughout this debate, these writers all agreed that the transferor, or donor, would suffer a net burden from the transfer, the only point of contention being the direction of any secondary effect on the donor's welfare. On the other hand, Leontief (1937) constructed a two-country example where the secondary improvement in terms of trade for the donor overwhelmed the initial burden of that country, so that welfare increased with the transfer. Samuelson (1947), however, argued that the dynamics of the Leontief example are incorrect, noting that his result 'can only happen for a system in which an increase in demand for a commodity lowers rather than raises its price' (1947, p. 29).

It is formally shown in Postlewaite and Webb (1980) that for the two-country case if there is a transfer which simultaneously benefits the donor and harms the recipient relative to the competitive equilibrium associated with the original initial endowment, then there must be multiple equilibria after the transfer where one of the competitive equilibria after the transfer does not give the counter-intuitive result. Balasko (1978) uses differential

methods to show that the economy, in fact, moves to an equilibrium after the transfer which makes the donor worse off while improving the lot of the recipient.

Leontief's example, however, did inject a new and interesting question into the transfer-problem discussion. Hatta, Bhagwati and Brecher (1983) have discovered two previously neglected papers which consider the possibility of such a paradoxical result in a three-agent model. Working with a two-country model (with one country disaggregated into two groups) Johnson (1960) shows that a transfer may yield paradoxical results; more importantly, Komiyama and Shizuki (1967) show that Johnson's results do not require the presence of unstable equilibrium.

Later, and independently, Gale (1974) and Brecher and Bhagwati (1981) show the possibility of a paradoxical transfer in a three-agent economy in the presence of market stability.<sup>1</sup> Bhagwati, Brecher and Hatta (1982), like Komiyama and Shizuki (1967) before them, derive the necessary condition for such a paradox in a three-agent economy. Postlewaite (1979) considers a general treatment of endowment transfers and manipulation of endowments.

In conclusion, the literature cited above establishes that a transfer in a three-agent economy can harm the recipient; reversing the flow of this transfer shows, of course, that the above recipient can improve its welfare by acting as a donor. In this paper we show that these two paradoxical results of a transfer may occur simultaneously. That is, in the model presented here, a transfer from one country to another can simultaneously be of benefit to the transferring country and harm the receiving country.<sup>2</sup>

## 2. The model and results

The three-country case offers results similar to those of two countries concerning changes in the terms of trade following commodity transfers. As in the two-country case, it is easily seen that a transfer may improve the transferring country's terms of trade. It is when the welfare effects of a transfer are considered that the results in the three-country case offer stark contrast to the two-country results.

We will use an example first used by Aumann (1973) and later developed by Drèze, Gabszewicz and Postlewaite (1977). We begin with a two-country model composed of country 1 and country 2 with initial endowments

$$w^1 = (2, 0) \quad \text{and} \quad w^2 = (0, 1),$$

<sup>1</sup>Such a paradoxical result may occur in a two-agent economy in the presence of a distortion; see, for example, Brecher and Bhagwati (1982).

<sup>2</sup>This problem has been independently investigated by Chichilnisky; see Chichilnisky (1983) and the references therein.

and social utility functions

$$\begin{aligned}
 u^1(x_1, x_2) &= 4x_1 + 5x_2 + 3 \min(2x_1, x_2) \\
 &= \min\{5(x_2 + 2x_1), 4(x_1 + 2x_2)\}, \\
 u^2(x_1, x_2) &= x_2 + 2x_1,
 \end{aligned}$$

for commodities 1 and 2. Let  $p_2$  be the price of commodity 2 in terms of commodity 1, where the price of good 1 is set equal to one.

The excess demands are displayed in table A.1 of the appendix. This economy possesses a unique (and thus stable) competitive equilibrium at  $p_2 = 3/2$ , where country 1 obtains the competitive allocation  $(1/2, 1)$  and country 2 obtains  $(3/2, 0)$ . With a transfer of  $7/16$  of its endowment to country 1, country 2 experiences an increase in its terms of trade as the price of its export good, commodity 2, increases; we get  $p_2 = 2$ , as shown in table A.2 of the appendix. The combined excess demands and equilibria in the two cases are displayed in fig. 1. At the new competitive equilibrium, country 1 is assigned  $(9/8, 1)$  and country 2 gets  $(7/8, 0)$ . The donor (country 2) finds the transfer to be disadvantageous, while the receiving country gains.

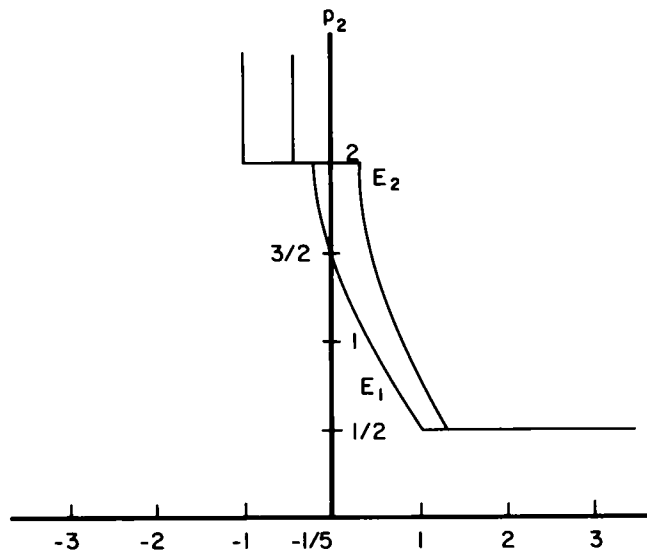


Fig. 1

Next, a third country, country 3, with initial endowment  $w^3 = (0, 1)$  and utility function



one-half unit of its import good; thus its demand for good 1 is perfectly inelastic. As  $p_2$  increases, the country's excess demand for its export commodity 2 increases.

When a transfer of some country 2's endowment is made to country 1, the receiving country demands more of good 2 while the donor demands less. In this case, an upward pressure on the price of good 2 is exerted as country 1's increased excess demand for that good overwhelms country 2's decreased excess demand. In the two-country case, where the economy is stable, the analysis ends with an increase in  $p_2$  (and country 2's terms of trade). In the three-country case of the example, however, country 3 offers smaller and smaller amounts of its export, commodity 2, in return for its import of  $1/2$  unit of commodity 1 as  $p_2$  increases (in the range between  $p_2 = 1/2$  and  $p_2 = 2$ ). The price of commodity 2, once it begins an upward movement, must move up to such an extent that country 2's willingness to sell more of that commodity overwhelms the desire of country 3 to sell less. The large increase in  $p_2$  leads to the decline in country 1's welfare and to the rise in both terms of trade and welfare for countries 2 and 3.

It is two aspects of the world economy which lead to these results. First, the transfer must initiate an increased demand for the export good of the donor. Secondly, the demand for the recipient's export must be highly inelastic on the part of the third country. Thus, as the price of the donor's export good goes up, the third country offers less of it in return for the recipient's export good. The price of the donor's export will increase to some new equilibrium level and, as in the example, be of such a high level that the donor is better off after the transfer, while the recipient is worse off.

### Appendix: Excess demands

Table A.1  
Two countries, pre-transfer.

Country 1		Country 2	
$p_2 < 1/2$	$(-2, 2/p_2)$	$p_2 < 1/2$	$(0, 0)$
$p_2 = 1/2$	$(-1, -2)$ to $(-2, -4)$	$p_2 = 1/2$	$(0, 0)$ to $(1/2, -1)$
$1/2 < p_2 < 2$	$\left( \frac{2}{2p_2 + 1}, -2, \frac{4}{2p_2 + 1} \right)$	$p_2 > 1/2$	$(p_2, -1)$
$p_2 = 2$	$(0, 0)$ to $(-8/5, 4/5)$		
$p_2 > 2$	$(0, 0)$		

Table A.1 (continued)

Country 1	Country 2
<i>Combined excess demands</i>	
$p_2 < 1/2$	$(-2, 2/p_2)$
$p_2 = 1/2$	$(-2, 4)$ to $(-1/2, 1)$
$1/2 < p_2 < 2$	$\left( \frac{2}{2p_2+1} - 2 + p_2, \frac{4}{2p_2+1} - 1 \right)$
$p_2 = 2$	$(p_2, -1)$ to $(-8/5 + p_2, -1/5)$
$p_2 > 2$	$(p_2, -1)$

Table A.2  
Two countries, post-transfer.

<i>Country 1</i>	
$p_2 < 1/2$	$(-2, 2/p_2)$
$p_2 = 1/2$	$(-2, 4)$ to $(-55/64, 55/32)$
$1/2 < p_2 < 2$	$\left( -2 + \frac{9/16p_2+2}{2p_2+1}, -9/16 + \frac{9/8p_2+4}{2p_2+1} \right)$
$p_2 = 2$	$(-11/18, 11/16)$ to $(0, 0)$
$p_2 > 2$	$(0, 0)$
<i>Country 2</i>	
$p_2 < 1/2$	$(0, 0)$
$p_2 = 1/2$	$(0, 0)$ to $(7/32, -7/16)$
$p_2 > 1/2$	$(7/16p_2, -7/16)$
<i>Combined excess demands</i>	
$p_2 < 1/2$	$(-2, 2/p_2)$
$p_2 = 1/2$	$(-2, 4)$ to $(-41/64, 41/32)$
$1/2 < p_2 < 2$	$\left( -2 + \frac{9/16p_2+2}{2p_2+1} + 7/16p_2, -1 + \frac{9/8p_2+4}{2p_2+1} \right)$
$p_2 = 2$	$(-1/2, 1/4)$ to $(7/16p_2, -7/16)$
$p_2 > 2$	$(7/16p_2, -7/16)$

Table A.3

Country 3 and combined excess demands: Pre-transfer.

<i>Country 3</i>	
$p_2 < 1/2$	(0, 0)
$p_2 = 1/2$	(0, 0) to (1/2, -1)
$1/2 < p_2 < 2$	$\left(1/2, \frac{p_2 - 1/2}{p_2} - 1\right)$
$p_2 = 2$	(1/2, -1/4) to (2, -1)
$p_2 > 2$	( $p_2$ , -1)
<i>Combined excess demands</i>	
$p_2 < 1/2$	(-2, $2/p_2$ )
$p_2 = 1/2$	(-2, 4) to (0, 0)
$1/2 < p_2 < 2$	$\left(\frac{2}{2p_2 + 1} - 3/2 + p_2, \frac{4}{2p_2 + 1} + \frac{p_2 - 1/2}{p_2} - 2\right)$
$p_2 = 2$	(9/10, -9/20) to (4, -2)
$p_2 > 2$	( $2p_2$ , -2)

Table A.4

Combined excess demand: Three countries, post-transfer.

$p_2 < 1/2$	(-2, $2/p_2$ )
$p_2 = 1/2$	(-2, 4) to (-9/64, 9/32)
$1/2 < p_2 < 2$	$\left(-3/2 + \frac{9/16p_2 + 2}{2p_2 + 1} + 7/16p_2, -2 + \frac{9/8p_2 + 4}{2p_2 + 1} + \frac{p_2 - 1/2}{p_2}\right)$
$p_2 = 2$	(0, 0) to (23/8, -23/16)
$p_2 > 2$	( $23/16p_2$ , -23/16)

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