THE GAINS FROM FREE TRADE*

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Most propositions on the gains from trade with many consumers consider only lump-sum transfers as redistributive tools. It is widely believed that nothing can be said unless such transfers are possible. In this note we show that such a belief, and the consequent pessimism concerning the applicability of welfare propositions in trade theory, are groundless. Indirect consumer taxes are sufficient to make free trade Pareto-superior to restricted trade under the same conditions that would make free trade better than restricted trade in the one-consumer case, i.e. that there be no terms-of-trade gain from trade restrictions. This extends some earlier work in Dixit and Norman (1980, ch. 3). The essence of our argument is very simple. Suppose the government can levy taxes on all commodities entering individual consumers' utility functions, i.e. on all goods and all factors. Then, by appropriate choices of tax rates, the government can leave all consumer prices unchanged when moving from restricted trade to free trade. That will leave all consumer demands and utility levels unchanged. If such a scheme is feasible, in the sense that it gives non-negative government revenue, it means that all consumers can be made as well off with free trade as with restricted trade, thus proving weak Pareto-superiority of free trade. If government revenue is strictly positive under such a scheme, free trade can be made strongly superior simply by lowering the consumption tax rate on some good that all consumers demand in a positive quantity.

If such a scheme is to be feasible, i.e. to give non-negative government revenue, the sum of individual consumers' expenditures must be less than the value of production, so the private sector must have a trade surplus. This enables us to derive an economically more meaningful feasibility condition, illustrated in figure 1. Let X^1 be the free trade output vector, and $\hat{P}^1$ the free trade world price vector; and let C^o be the sum of individual demand vectors with restricted trade (= the corresponding sum under free trade given the appropriate consumer taxes). Then the scheme is feasible if, and only if, C^o lies within the budget constraint generated by $\hat{P}^1.X^1$, i.e. below the line b^1b^1 in figure 1. But we know that $\hat{P}^1.X^1$ is the maximum value of output given $\hat{P}^1$ and the production set generated by individual factor supplies at the fixed consumer prices. The restricted trade output vector, X^o, is on the frontier of this same set; so $\hat{P}^1.X^o \leqslant \hat{P}^1.X^1$. <u>A sufficient</u> condition for the indirect taxation scheme to be feasible, therefore, is that C^o be below the line b^ob^o, i.e.

$$\hat{P}^1.C^o \leqslant \hat{P}^1.X^o$$

or

$$\hat{P}^1.(X^o-C^o) = \hat{P}^1.Z^o \geqslant 0$$

where Z^o is the restricted-trade vector of exports.

Before we interpret this condition, let us put the argument rigorously. We use the following notation:

(p,w)	-	consumer prices of goods and factors
(c^h,v^h)	-	consumer h's vector of demands for goods and supplies of factors
(C,V)	-	aggregate goods demands and factor supplies
(P,W)	-	producer prices of goods and factors
X	-	vector of outputs
G	-	vector of government demands
Z	-	vector of exports
$\hat{P}$	-	world equilibrium price vector

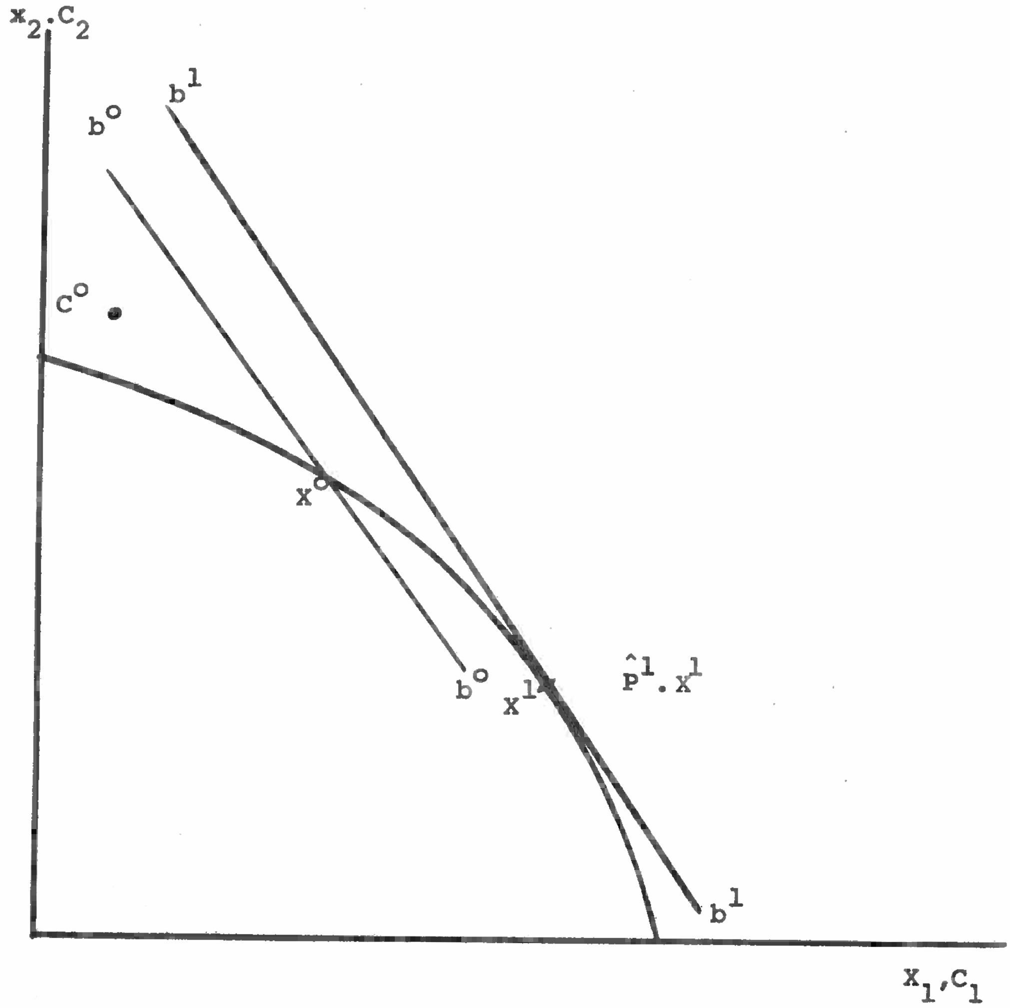

Figure 1

We shall assume that there are constant returns to scale in production, so that all income is factor income. It can be argued that this is not really an assumption, as we can always define artificial factors as repositories of any pure profits. In the context of indirect taxation such a procedure is misleading, however, because it implies that these artificial factors can be taxed. We prefer to take the constant-returns assumption as an assumption of linearly homogeneous technology defined over (identifiable and thus) taxable factors.

With constant returns, output supplies/factor demands yield zero profits, so

$$P.X - W.V = 0 \tag{1}$$

Moveover, in the absence of lump-sum transfers, the value of individual demands for goods is constrained by factor income, so the individual demand/supply vectors satisfy

$$p.c^h - w.v^h = 0 \qquad \text{(all h)} \tag{2}$$

Summing over all individuals, we get

$$p.C - w.V = 0 \tag{3}$$

The world price vector $\hat{P}$, the producer price vector (P,W), and the consumer price vector (p,w) implicitly define tariffs

$$t \equiv P - \hat{P} \tag{4}$$

and consumer taxes on goods and factors

$$\Theta \equiv (p - P, W - w) \tag{5}$$

so net tax revenue, call it R, is

$$R = (P - \hat{P})\cdot(C-X) + (p - P)\cdot C - (w - W)\cdot V$$
$$= \hat{P}\cdot(X-C) - (P\cdot X - W\, V) + (p\cdot C - w\cdot V)$$
$$= \hat{P}\cdot(X-C) \tag{6}$$

using (1) and (3). This revenue is spent on goods according to some rule, giving government demands G satisfying

$$\hat{P}\cdot G = R \tag{7}$$

Net export supply is then

$$Z = X - C - G \tag{8}$$

which, when set equal to net foreign demand, determines the world equilibrium price vector $\hat{P}$.

Let us now compare two such equilibria, one labelled 0 in which there are trade restrictions (so $t^o \neq 0$), the other labelled 1 with free trade (so $t^1 = 0$). There are consumer taxes in both equilibria, and those under free trade are set so that consumer prices are the same in the two situations, equal to (p^o, w^o). Then all consumers are indifferent between the two equilibria, and the same demand/supply vectors (c^{ho}, v^{ho}) are optimum choices for the consumers in the two situations. We shall then say that one equilibrium is better than the other if it permits at least as great government purchases of all goods. In particular, then, the free trade equilibrium is superior if $\hat{P}^1.(G^1-G^o)\geq 0$.

To see under what conditions this inequality holds, use (8) to write

$$\hat{P}^1 \cdot (G^1 - G^o) = \hat{P}^1 \cdot ([X^1 - C^1 - Z^1] - [X^o - C^o - Z^o])$$

But individual demands C^h are unchanged, so $C^1 = C^o$, so we get

$$\hat{P}^1 \cdot (G^1 - G^o) = \hat{P}^1 \cdot (X^1 - X^o) - \hat{P}^1 \cdot (Z^1 - Z^o)$$

$$= P^1 \cdot (X^1 - X^o) + \hat{P}^1 \cdot Z^o \qquad (9)$$

Since $P^1 = \hat{P}^1$ with free trade, and since $\hat{P}^1 \cdot Z^1 = 0$ follows from (6), (7) and (8). But we know from profit maximisation that

$$P^1 \cdot X^1 - W^1 \cdot V^1 \geq P^1 \cdot X^o - W^1 \cdot V^o$$

and $V^1 = \sum_h V^{h1} = \sum_h V^{ho} = V^o$, so $P^1 \cdot (X^1 - X^o) \geq 0$. A strongly sufficient condition for $\hat{P}^1 \cdot (G^1 - G^o) \geq 0$ is therefore that

$$P^1 \cdot Z^o \geq 0 \qquad (10)$$

In words, income redistribution through indirect taxes can make free trade Pareto superior to restricted trade so long as the value of the restricted-trade export vector is positive when evaluated at free-trade equilibrium prices.

To interpret this, note first that (10) is automatically satisfied for $Z^o = 0$. Thus, commodity taxation can always be used to make free trade Pareto-superior to autarky. Similarly, (10) is clearly satisfied if $\hat{P}^1 = \hat{P}^o$, since $\hat{P}^o \cdot Z^o = 0$. Thus, free trade can be made Pareto-superior to restricted trade for a country facing fixed world prices.

Generally, we can write

$$\hat{P}^1 \cdot Z^o = (\hat{P}^1 - \hat{P}^o) \cdot Z^o + \hat{P}^o \cdot Z^o$$

But since $\hat{P}^o \cdot Z^o = 0$, we can then write (10) as

$$(\hat{P}^1 - \hat{P}^o) \cdot Z^o \geq 0 \qquad (11)$$

But the left-hand side of this is simply the improvement in the terms of trade going from restricted trade to free trade. Thus, the indirect taxation compensation scheme is feasible so long as the terms of trade do not deteriorate when moving from restricted trade to free trade. In other words, the only case for trade restrictions is the terms-of-trade argument familiar from one-consumer analyses. This is so even in the absence of any lump-sum transfers among the consumers. So long as indirect taxation is possible, concern for income distribution does not provide a case for trade intervention.

Reference:

A. Dixit and V. Norman (1980), Theory of International Trade, Cambridge Economic Handbook, Nisbets and C.U.P.