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The effect of tariffs on real factor rewards in the two-country, two-
commodity, two-factor model are well known. Except when the tariff has no
effect on the domestic price ratio, tariffs increase one of the factors real
reward in terms of any commodity price and decrease the others. When the tariff
revenue is assumed to be distributed to the public the welfare of factor owners,
however, depends not only on real factor rewards but also on their share of the
tariff revenue. This raises the question: Under what conditions can the fac-
tor that experiences a fall in its real reward, as a result of a tariff, be fully
compensated out of the tariff revenue? That one of the factors loses and that
the only feasible income transfers may involve "dead-weight" losses makes it in-
teresting to know these conditions, if they exist, under which a country can
attain Pareto-superior equilibria by manipulating the tariff rate only and dis-
tributing the tariff revenue. Earlier writers have considered this normative
extension of the Stolper-Samuelson theorem and partial answers can be found in
Bhagwati (1959) and Johnson (1960). This problem is analyzed in this paper
within the framework of a two-class, two-sector model of international trade.
A necessary and sufficient condition for compensating the losing factor as well
as a necessary condition and a sufficient condition are obtained. Further, a
diagrammatic representation of the necessary and sufficient condition is given.

The production side of the model is adopted from the two-country, two-
commodity, two-factor Heckscher-Ohlin-Samuelson model. The demand side of the
model has two classes: the idealization adopted is that of treating each factor
as also a consuming class. The following assumptions are made. The world is
assumed to consist of two countries: the home country and the rest of the world.

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from the Economic Development Center of the University of Minnesota.
In each country: there are two factors, labor and capital, in fixed supply and perfectly mobile within countries and completely immobile among countries, two sectors producing goods 1 and 2, production functions are identical among countries and display constant returns to scale and diminishing returns to proportions, there are no factor intensity reversals, there is perfect competition and no externalities, and both countries are incompletely specialized. In each country there are two consuming groups: capitalists and workers, each capitalist supplies some fixed positive amount of capital and each worker supplies some fixed positive quantity of labor. Assumptions about individual preferences are: homothetic (not necessarily identical) and strictly quasi-concave utility functions and monotonicity of preferences. The sense in which we could then consider two consuming groups is explained later. The following notation is adopted for the home country: $Y_i$ for the quantity produced of the $i^{th}$ good, the two classes, workers and capitalists, are denoted by $\lambda$ and $c$, $k_i$ for the capital labor ratio in the $i^{th}$ sector, $X_{ij}$ denotes the demand for the $i^{th}$ good by the $j^{th}$ class, $E_i$ for aggregate excess demand for the $i^{th}$ good, $p$ for the price of good 2 relative to good 1, aggregate income in terms of good 1 is denoted by $Z$, and income of workers and capitalists (in terms of good 1) as $Z_{\lambda}$ and $Z_{c}$. An asterisk relates to the variable of the rest of the world except that $q$ denotes the world price of good 2 in terms of good 1.

It is assumed that the home country imports good 2 and $t$ denotes its import tariff rate. The home government distributes the tariff revenue to workers and capitalists, $\alpha_j$ being the proportion of the tariff revenue given to the $j^{th}$ class and $\sum_j \alpha_j = 1$. Consider the foreign country. From the well known properties of the two-sector model, the supply function of the $i^{th}$ good can be written as

$$Y_i^* = h_i^*(q),$$

and we have:

$$h_1^*(q) < 0, \quad h_2^*(q) > 0, \quad h_1^*(q) + q h_2^*(q) = 0.$$ 

Real factor rewards of workers and capitalists, in terms of good 1, can be expressed as:

$$Z_j^* = \phi_j^*(q), \quad j = \lambda, c,$$

further, we have:
(4) \[ \varphi^*_c(q) < 0 \quad \text{if} \quad k_1^* < k_2^* \]
\[ \varphi^*_c(q) > 0 \quad \text{if} \quad k_1^* > k_2^* \]

From the assumptions about individual preferences it follows that each class can be thought of behaving as if it were a rational unit maximizing an aggregate utility function and further as a rational unit with a homothetic utility function. From this we get the demand function for the \( i \) th good by the \( j \) th class as:

(5) \[ x^*_{ij} = g^*_{ij}(q, \varphi^*_j(q)) = g^*_{ij}(q). \]

Further, we have:

(6) \[ q = \frac{p}{1+t}. \]

Collecting information from (1), (3), (5) and (6), the foreign excess demand function for the \( i \) th good is defined as

(7) \[ E^*_i = g^*_s(q) + g^*_c(q) - h^*_i(q) = h^*_i(q) = h^*_i(p,t). \]

With one difference, the home country's excess demand functions can be defined in a similar fashion. The real income of home factor owners consists of not only their real factor rewards but also their share of the tariff revenue. This also has implications for the invariance of the aggregate utility functions of domestic workers and capitalists. Consider, for instance, the home capitalist class. We have assumed that each capitalist supplies some fixed positive amount of capital and that all capitalists have homothetic (not necessarily identical) utility functions. Suppose the government is contemplating distributing some tariff revenue to the capitalist class. For the utility function of the "aggregate capitalist" to remain invariant we have to stipulate that the revenue is handed to the various capitalists in the same proportion as their share of the total capital; and therefore we add this further assumption about tariff revenue distribution. We have for the home country:

(8) \[ z^*_j = \varphi^*_j(p) - \frac{\alpha^*_j p}{1+t} h^*_2(p,t) = v^*_j(p,t). \]
(9) \[ X_{ij} = g_{ij} [p, v_j (p,t)] \]

(10) \[ y_i = h_i (p) \]

(11) \[ e_i = x_{il} + x_{ic} - y_i = h_i (p,t). \]

Defining the world excess demand for the \(i^{th}\) good as: \(j_i (p,t) = h_i (p,t) + h_i^* (p,t);\) the international equilibrium condition is 7:

(12) \[ j_2 (p,t) = h_2 (p,t) + h_2^* (p,t) = 0. \]

By the implicit function theorem if \(\frac{\partial j_2}{\partial p} \neq 0\) at an equilibrium point \((p_o, t_o)\), then in a neighborhood of the equilibrium there exists a unique function \(p = P(t)\). Utilizing this, a welfare criterion of when a factor can be said to gain is established. In a neighborhood of the equilibrium, (6), (8) and (9) can be expressed as:

(6') \[ q = \frac{P(t)}{1 + t} = q(t) \]

(8') \[ z_j = \phi_j [P(t)] - a_j t P(t) \frac{h_2^* [P(t), t]}{1 + t} = v_j (t) \]

(9') \[ x_{ij} = g_{ij} [P(t), v_j (t)] = g_{ij} (t). \]

The utility function of the \(j^{th}\) class is formally defined as:

(13) \[ u_j = F_j (x_{1j}, x_{2j}), \]

and from (9') it follows that \(u_j\) can also be expressed, in a neighborhood of the equilibrium point as a function of \(t\) only. That is

(13') \[ u_j = F_j \left\{ g_{1j} [P(t), v_j (t)], g_{2j} [P(t), v_j (t)] \right\} = f_j (t). \]

The total derivative of (13') with respect to \(t\), at initial \(t = t_o\), is

(14) \[ \frac{d u_j}{dt} = F_{j1} \frac{d x_{1j}}{dt} + F_{j2} \frac{d x_{2j}}{dt}. \]

First, we note that from the first order conditions for a utility maximum we have: \(F_{j1} = \lambda_j, F_{j2} = \lambda_j p,\) and substituting these we get:

(14') \[ \frac{d u_j}{dt} = \lambda_j \left[ \frac{d x_{1j}}{dt} + p \frac{d x_{2j}}{dt} \right]. \]
We introduce some further notation:

\[ S_{ij} = \frac{\partial G_{i1}}{\partial p} + X_{2j} \frac{\partial G_{i1}}{\partial z_j}; \quad S_{ij}^* = \frac{\partial G_{i1}^*}{\partial q} + X_{2j}^* \frac{\partial G_{i1}^*}{\partial z_j^*}; \]

\[ S_i^* = S_{il}^* + S_{ic}^* - h_i^* \]

\[ m_{1j} = \frac{\partial G_{i1}}{\partial z_j}; \quad M_{2j} = \rho m_{2j}; \quad R_j = X_{2j} - \phi_j (p) \]

\[ \eta_i^* = \frac{q}{E_i^*} \frac{\partial E_i}{\partial q}; \quad \Delta (p,t) = \frac{\partial J_2}{\partial p} = \frac{\partial H_2^*}{\partial p} \]

Differentiating (9'), we get:

\[ \frac{dX_{1j}}{dt} = (S_{1j} - X_{2j} m_{1j}) \frac{dp}{dt} + m_{1j} \frac{dz_j}{dt}. \]

Hence, substituting (15), (14') can be written as:

\[ \frac{dU_j}{dt} = \lambda_j \left[ (S_{1j} + ps_{2j}) \frac{dp}{dt} + (m_{1j} + pm_{2j}) \left( \frac{dz_j}{dt} - X_{2j} \frac{dp}{dt} \right) \right]. \]

The sum of the marginal propensities \( m_{1j} + pm_{2j} = 1 \); and from Hicks (1946) we have \( S_{1j} + ps_{2j} = 0 \). Hence, (16) reduces to:

\[ \frac{dU_j}{dt} = \lambda_j \left( \frac{dz_j}{dt} - X_{2j} \frac{dp}{dt} \right). \]

Differentiating (8') with respect to \( t \), we get at \( t = t_0 \):

\[ \frac{dz_j}{dt} = \phi_j' (p) \frac{dp}{dt} - \alpha_j q E_2^* - \frac{tc_j}{1+t} (E_2^* + q H_2^*) \left( \frac{dp}{dt} - q \right). \]

The effect of the tariff on the domestic price ratio can be obtained from (12). Differentiating (12) with respect to \( t \) and solving for \( \frac{dp}{dt} \) we get at \( t = t_0 \):

\[ \frac{dp}{dt} = \frac{q}{\Delta (p,t)} \left[ \frac{\partial H_2^*}{\partial p} (1 - \alpha_2 t q m_{2b} - \alpha_c t q m_{2c}) - \frac{E_2}{1+t} (\alpha_2 m_{2b} + \alpha_c m_{2c}) \right]. \]

Substituting for \( \frac{dz_j}{dt} \) from (17) and for \( \frac{dp}{dt} \) from (18) in (16') and simplifying we get at \( t = t_0 \):
\[ \frac{dU}{dt} = \frac{E_2 \lambda_1}{(1+t)^2 \Delta(p,t)} \left\{ (1+t-t)^* \left[ \left( \alpha_j \frac{E_2 - R_j}{E_2} \right) (\alpha_j \frac{m_{1k}}{m_{1c}} + \alpha_c \frac{m_{1c}}{m_{1c}}) + \alpha_j pS_2 \right. \right. \\
+ \left. \left. \alpha_j \left( M_{2k} - M_{2c} \right) (\alpha_j \frac{R_c - \alpha_c R_c}{R_c}) \right] - \left( \alpha_j \frac{E_2 - R_j}{E_2} \right) \eta_1^* \right\}. \]

If we assume that \( \frac{\partial J_2}{\partial p} \neq 0 \), then the initial equilibrium position will be locally stable under the Walrasian "tatonnement" dynamic adjustment process if and only if: \( \Delta(p,t) = \frac{\partial J_2}{\partial p} < 0 \). We will hereafter assume that the initial international equilibrium is locally stable. Marginal utility of income \( \lambda_j > 0 \). Therefore, the \( j \)th class will be at least as well off as initially i.e.,

\[ \frac{dU}{dt} \equiv 0, \text{ if and only if the expression in brackets in (19) is non-positive.} \]

Thus the welfare criteria to be satisfied for each class to be at least as well off as initially are: for the capitalist class

\[ (1+t-t)^* \left[ \alpha_c pS_2 - m_{1k} (\alpha_j \frac{R_c - \alpha_c R_c}{R_c}) \right] - \eta_1^* (\alpha_j \frac{R_k - \alpha_k R_c}{R_c}) \leq 0, \]

and for the worker class

\[ (1+t-t)^* \left[ \alpha_c pS_2 + m_{1c} (\alpha_j \frac{R_c - \alpha_c R_c}{R_c}) \right] + \eta_1^* (\alpha_j \frac{R_k - \alpha_k R_c}{R_c}) \leq 0. \]

Given that the allowable income reallocation is limited only to distributing the tariff revenue according to some fixed formula, (20) and (21) can be combined to yield the following proposition: an economy can attain a Pareto-superior equilibrium by changing the tariff rate if and only if the following condition holds with at least one strict inequality:

\[ (1+t-t)^* \left[ \alpha_c pS_2 + m_{1k} (\alpha_j \frac{R_c - \alpha_c R_c}{R_c}) \right] \equiv \eta_1^* (\alpha_j \frac{R_k - \alpha_k R_c}{R_c}) \]

\[ \leq (1+t-t)^* \left[ m_{1c} (\alpha_j \frac{R_c - \alpha_c R_c}{R_c}) - \alpha_j pS_2 \right]. \]

Before giving an interpretation of (22), we first establish a set of two necessary conditions and a sufficient condition to be able to compensate the losing factor. Recall the definition of \( S_2 = S_{2k} + S_{2c} - h'_2 \); as it is the sum of the consumption substitution terms and the production effect contained in \( \eta_1^* \) it is always negative. Now consider \( 1+t-t_1^* \eta_1^* \). If
\[ \eta_1^* \leq 1 \] then \(1 + t - t \eta_1^* > 0\). If \(\eta_1^* > 1\) and \(\alpha_c R_e - \alpha_c R_c < 0\), then \(\alpha_c p S_2 + m_{1\ell} (\alpha_c R_e - \alpha_c R_c) < 0\). Therefore, for compensating the capitalist class, i.e., for (20) and the left inequality in (22) to be satisfied we need \(1 + t - t \eta_1^* > 0\). Similarly, if \(\eta_1^* > 1\) and \(\alpha_c R_e - \alpha_c R_c > 0\), for compensating workers, i.e., for (21) and the right inequality in (22) to be satisfied we need \(1 + t - t \eta_1^* > 0\). Thus, a necessary condition for both classes to be at least as well off as initially is that \(1 + t - t \eta_1^* > 0\). Geometrically this implies that at the initial equilibrium the domestic price line lies in between the foreign offer curve and the world price line. Now before we establish the second necessary condition, we digress to find the effect of the tariff on the terms of trade. Differentiating (6') we get

(23) \[ \frac{dO}{dt} = \frac{1}{1 + t} \left[ \frac{dp}{dt} - q \right]. \]

Substituting for \(\frac{dp}{dt}\) from (18) we get at initial \(t = t_o\)

(24) \[ \frac{dO}{dt} = \frac{-1}{(1 + t)^2 \Delta(p, t)} \left[ p S_2 + (m_{1c} - m_{1\ell})(\alpha_{\ell_c} R_c - \alpha_c R_e) \right]. \]

If it is assumed: that the home country behaves as if it were a single rational unit and that the tariff revenue is distributed to the public, then the possibility of a deterioration of the terms of trade as a result of changing the level of the tariff does not exist as \(S_2 < 0\). However, that the remarkable possibility of a deterioration of the terms of trade exists in a disaggregated demand model was shown by Johnson (1960). Assuming that the initial equilibrium is locally stable, we get the condition for a non-improvement of the terms of trade, that is for \(\frac{dO}{dt} \equiv 0\), as

\[ p S_2 + (m_{1c} - m_{1\ell})(\alpha_{\ell_c} R_c - \alpha_c R_e) \equiv 0. \]

Now suppose that no class is worse off and at least one class is better off. From (20) and (21), summing, we get:

\[ (1 + t - t \eta_1^*) \left[ p S_2 + (m_{1c} - m_{1\ell})(\alpha_{\ell_c} R_c - \alpha_c R_e) \right] < 0. \]

Given \((1 + t - t \eta_1^*) > 0\), this cannot hold if the terms of trade does not improve. Therefore, we have: the set of two necessary conditions to be satisfied for
at least one class to be better off and no class to be worse off are:

$$(25) \quad \begin{align*}
\text{(i)} \quad & \quad \frac{d Q}{d t} < 0 \\
\text{(ii)} \quad & \quad 1 + t - t \eta_1^* > 0.
\end{align*}$$

Johnson (1960) has pointed the necessity of (25.i) for compensating the losing factor. Arguing from the optimum tariff theory, Bhagwati (1959) pointed out the necessity of $t < \frac{1}{\eta_1^* - 1}$ for compensating the losing factor. This is true only if $\eta_1^* > 1$. On the other hand if $0 < \eta_1^* < 1$ this condition, apart from requiring $t < 0$, provides a necessary condition for one of the factors to be worse off. Therefore, his conclusions for the Metzler case, where $\eta_1^* < 1$, need modification. A sufficient condition when both factors could be made better off is known: the case where $\frac{d P}{d t} = 0$ (i.e., no factor's real reward is changed as a result of the tariff). Consider (18): rewriting the expression in brackets we get this condition for $\frac{d P}{d t} = 0$ to be:

$$(26) \quad \alpha_\ell m_{1\ell} + \alpha_c m_{1c} = \frac{\eta_1^*}{1 + t - t \eta_1^*}.$$  

We can add a further sufficient condition to this. Let us denote $\alpha_c R_\ell - \alpha_\ell R_c = A$. Assuming that (25) holds, if $A < 0$, we can rewrite (22) as:

$$m_{1\ell} + \frac{\alpha_c p S_2}{A} \equiv \frac{\eta_1^*}{1 + t - t \eta_1^*} \equiv m_{1c} - \frac{\alpha_\ell p S_2}{A}.$$  

As $S_2 < 0$, this will always be satisfied if: $m_{1\ell} \equiv \frac{\eta_1^*}{1 + t - t \eta_1^*} \equiv m_{1c}$. Similarly, if $A > 0$, we get that (22) will always be satisfied if: $m_{1c} \equiv \frac{\eta_1^*}{1 + t - t \eta_1^*} \equiv m_{1\ell}$.

Combining these, under the assumption that (25) holds, we get that (22) will always be satisfied when

$$(27) \quad \begin{align*}
\text{(i)} \quad & \quad m_{1\ell} \equiv \frac{\eta_1^*}{1 + t - t \eta_1^*} \equiv m_{1c} \quad \text{if } A < 0
\end{align*}$$
\( m_{1c} = \frac{\eta_1^*}{1 + t - t \eta_1^*} \equiv m_{1k} \) if \( A > 0 \).

What we can conclude from (26) and (27) is that when the effect of the tariff on the domestic price ratio is "small" we can always compensate the losing factor.

We will now turn to interpreting the necessary and sufficient condition (22). Using the geometric technique introduced by Johnson (1959) to depict international equilibrium in a two-class model, (22) can be given a diagrammatic representation. For diagrammatic simplicity, we will assume that: (i) the effect of the tariff on the domestic price ratio and terms of trade is normal, i.e., \( \frac{dP}{dt} > 0 \) and \( \frac{dQ}{dt} < 0 \), (ii) the home country's import good 2 is labor intensive, (iii) all the tariff revenue is given to capitalists, the losing class, i.e., \( \alpha_c = 1 \), and (iv) initial situation is one of free trade. The welfare criterion (20), for the capitalist class to be at least as well off as initially, reduces to:

\[
(20') \quad p S_{2} + R_2 m_{1k} - R_2 \eta_1^* \leq 0.
\]

Foreign offer curve, relating foreign exports and foreign imports, can be expressed as: \( E_2^* = \eta (E_1^*) \). Walras' law holds identically in prices for the foreign country, i.e., \( E_1^* + q E_2^* = 0 \), and using this we can express the slope of the foreign offer curve at the initial equilibrium as \( \frac{dE_2^*}{dE_1^*} = \frac{1 - \eta_1^*}{\eta_1^*} \). Consider

real factor reward of workers in terms of good 2: \( \frac{\varphi_2^*(p)}{p} \). Since we have assumed \( k_1 > k_2 \), by the Stolper-Samuelson theorem, factor reward of workers in terms of any commodity price increases with \( p \). Thus

\[
\frac{d}{dp} \left[ \frac{\varphi_2^*(p)}{p} \right] = \frac{\varphi_2'(p)}{p} - \frac{\varphi_2^*(p)}{p^2} > 0.
\]

Substituting \( \varphi_2^* = X_{1k} + p X_{2k} \), we get \( \varphi_2' - X_{2k} > X_{1k}/p \). From this it follows that \( R_2 = X_{2k} - \varphi_2'(p) < 0 \). Let us also recall that from the properties of the substitution terms in consumption: \( S_{1j} + p S_{2j} = 0 \) (from Hicks (1946)), and from the properties of the two-sector model (2): \( h_1' (p) + p h_2'(p) = 0 \). Using all this information, (20') can be recast as:

\[
(28) \quad \frac{dE_2^*}{dE_1^*} = \frac{S_{2k} + S_{2c} - R_2 m_{2k} - h_2'}{S_{1k} + S_{1c} - R_2 m_{1k} - h_1'}.
\]
Consider Figure 1 depicting the initial free trade equilibrium. Corresponding to the equilibrium price ratio $P_0$, and the initial production point $C$, factor rewards of capitalists and workers imputed in terms of good 1 are given by OA and AB. Origins of the indifference maps of capitalists and workers are at 0 and C, and the initial capitalist and worker equilibrium points are at D and E. Displaced foreign offer curve is shown by ED with origin at E. Initial quantities demanded by capitalists: $X_{1C}^O$, $X_{2C}^O$ are OF and FD; worker demands: $X_{1W}^O$, $X_{2W}^O$ are CG and EG; home production of the two goods: $Y_1^O$, $Y_2^O$ are shown by OH and CH; and home imports and exports: $E_1^O$ and $E_2^O$ are DJ and EJ. Now consider the introduction of a small import tariff by the home country. Domestic price ratio $p$ increases, hence factor reward of workers increases in terms of any commodity price and that of capitalist falls. Suppose the new domestic price ratio is given by $P_1$ and the new production point is given by $C'$. The origin of the worker indifference map shifts from C to $C'$, and together with their increased real reward the new worker equilibrium is given by $E'$. The locus of worker equilibrium points like $E, E'$...is shown by $EL$. Let us for a moment disregard the shift in the origin of worker's indifference map. Consider $(8')$ and $(9')$. Since we assumed capitalists get all the tariff revenue we could rewrite these as: $Z_1 = \phi_{x1} [P(t)]$ and $X_{1l} = G_{1l} [P(t), \phi_{x1} [P(t)]] = G_{1l} [P(t)]$. From this, similar to $(15)$, we get changes in equilibrium demands of workers with changes in $p$ as:

$$\frac{dx_{1l}}{dp} = S_{1l} - X_{2l} m_{1l} + m_{1l} \delta_\phi = S_{1l} - R_{lm} m_{1l}.$$ 

The slope of the locus of such worker equilibrium points, when the origin of their indifference map is regarded as fixed at C, when evaluated at E in Figure 1 is given by: $\frac{S_{2l} - R_{lm} m_{2l}}{S_{1l} - R_{lm} m_{1l}}$. The locus $EL$ consists also of production changes in the economy as a result of the changing domestic price ratio; hence the slope of $EL$ when evaluated at E equals:

$$\frac{S_{2l} - R_{lm} m_{2l} - h_2'}{S_{1l} - R_{lm} m_{1l} - h_1'}.$$ 

The consumption substitution effects of capitalists corresponding to price changes is given by a movement along $\Gamma_C^O$; for instance
Figure 1.
for a change in \( p \) from \( p_0 \) to \( p_1 \), there is a movement from \( D \) to \( D' \). Now consider the possibility of compensating capitalists, the losing factor. Given the new domestic price ratio \( p_1 \) and the new worker equilibrium \( E' \), the possibility of over-compensating capitalists hinges on whether the displaced foreign offer curve with origin at \( E' \) covers \( D' \) or not. This is exactly what (28) tells us. Let us derive a new locus \( EL \) from \( E \), by adding the substitution effects of capitalists to the terms already present in \( E \); that is a locus \( EL \) with its slope when evaluated at \( E \) given by:

\[
\frac{S_{2l} - R_{m2l} - h' + S_{2c}}{S_{1l} - R_{m1l} - h' + S_{1c}}.
\]

Now we are in a position to interpret condition (28) in terms of Figure 1. Denoting the slope of the foreign offer curve \( ED \) at the initial equilibrium point \( D \) as \( \gamma \), and slope of \( EL \) at initial equilibrium \( E \) as \( \beta \), four possible cases can be distinguished:

i) \( \gamma < 0, \ \beta < 0 \)

To be able to compensate capitalists, the slope of \( EL \) at \( E \) should be at least as steep as the slope of the foreign offer curve at \( D \); then the displaced foreign offer curve with its origin moving along \( EL \) will cover \( D \).

ii) \( \gamma > 0, \ \beta < 0 \)

In this case capitalists can always be compensated.

iii) \( \gamma < 0, \ \beta > 0 \)

When this occurs capitalists can never be compensated.

iv) \( \gamma > 0, \ \beta > 0 \)

For compensating capitalists the slope of the foreign offer curve should be at least as steep at \( D \) as the slope of \( EL \) at \( E \).
References


Hicks, J. R.  Value and Capital, 1946.


Footnotes

1 The classic contributions are those of Stolper and Samuelson (1941) and Metzler (1949 a,b). See also Bhagwati (1959) and Johnson (1960).

2 The important distinction between real income of factor owners and real factor rewards was first pointed out by Bhagwati (1959).

3 This two-class framework was originally introduced by Johnson (1959).

4 Some of the properties of the two-sector model are stated here without the actual derivations being shown. See Uzawa (1961) and Kemp (1969).

5 For a proof of this statement see Rao (1970).

6 As we will be dealing in this paper with equilibrium situations, the property that at an equilibrium $E + E^* = 0$ has been used in defining the home country's tariff revenue.

7 It is assumed that an equilibrium exists for the model we are considering. See Sontheimer (1969) for a discussion of the existence of equilibrium in an international trade model with tariffs.

8 For a further discussion of this see Rao (1970).

9 See Bhagwati (1959) and Johnson (1960).

10 The following draws heavily on Professor Chipman's treatment of gains from trade in international trade courses at the University of Minnesota.